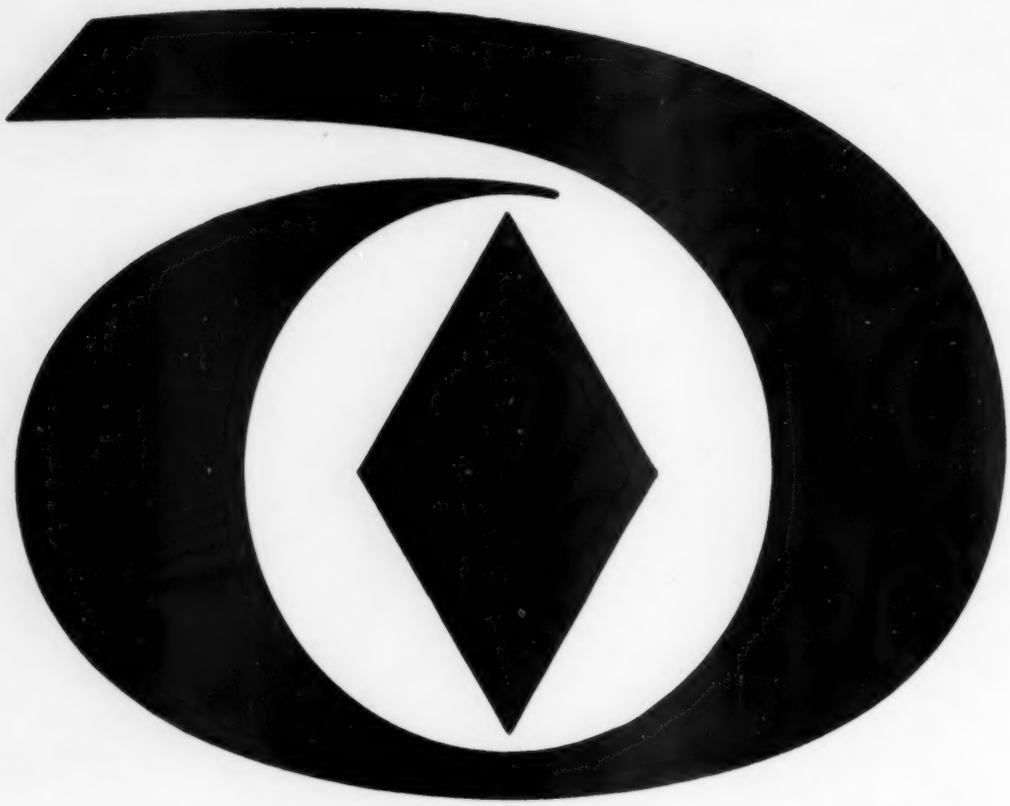
ARMED FORCES CHEMICAL JOURNAL

12th ANNUAL MEETING NUMBER

—U. S. Army Photo

JULY-AUGUST 1957



MARK FOR THE FUTURE

A fifteenth-century calligrapher in a French monastery, bending over his manuscript in the flickering light, made the letter "d" like this...

A dedicated chemist, reshaping his apparatus at a cluttered bench, found it was easier to heat or decompose a substance in a retort shaped like this...

Since 1910 Diamond Alkali has made chemicals for industry. Since 1948 we have linked a red diamond and the company's name in this design...

These three facts have now inspired a new trademark...a startling, memorable symbol of Diamond's solid growth, Diamond's enthusiasm for research, Diamond's contribution to countless facets of our everyday lives.

You'll see the new trademark often...at our 15 plants across the nation...on tank cars, trucks and barges...on drums, bags, pails and bottles... wherever chemicals make industry hum. It's an enduring mark of Diamond's determination to fill your future with "Chemicals you live by." Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals

Armed Forces CHEMICAL JOURNAL

OFFICIAL PUBLICATION OF THE ARMED FORCES CHEMICAL ASSOCIATION
SUITES 408-410, 2025 EYE STREET, N.W., WASHINGTON 6, D.C.

VOLUME XI | JULY-AUGUST 1957 | NO. 4

POLICY

The fact that an article appears in this magazine does not indicate approval of the views expressed in it by any one other than the author. It is our policy to print articles on subjects of interest in order to stimulate thought and promote discussion; this regardless of the fact that some or all of the opinions advanced may be at variance with those held by the Armed Forces Chemical Association, National Officers, and the Editors. It is the responsibility of contributors, including advertisers, to obtain security clearance, as appropriate, of matter submitted for publication. Such clearance does not necessarily indicate indorsement of the material for factual accuracy or opinion by the clearing agency.

Editor

COL. JOHN C. MacARTHUR
U.S.A.-(Ret.)

Associate Editor

COL. L. WILSON GREENE
Cml. C. USAR

Contributing Editors

DR. DAVID B. DILL; MR. JOHN A. KLEY; MR. IRVING PORETZ

Advertising Director

LT. COL. O. E. ROBERTS, JR.
USAR-(Ret.)

COVER PHOTO

The period of this issue of the Journal embraces three National observances calling for the display of the Flag of the United States. These are—Memorial Day, May 30; Flag Day, June 14; and, Independence Day, July 4. Use of the picture of Old Glory on our cover at this time in recognition of these days therefore seems especially appropriate.

INDEX

	Page
A.F.C.A.—Annual Meeting, General Report	9
A.F.C.A.—Affairs, Miscellaneous Items	6
A.F.C.A.—Directors-at-Large, pictures	4
A.F.C.A.—Executive Committee, pictures	3
A.F.C.A.—Group and Sustaining Members	14
A.F.C.A.—Organization	2
A.F.C.A.—Science Teacher $1000 Award	24
A.F.C.A.—Thunderbirds, Demonstration For	21
A.F.C.A. Meeting Speeches Printed in this Issue:	
Cdr. A. B. Chilton, USN	28
Maj. Gen. Wm. M. Creasy, USA	26
Maj. Gen. J. P. Daley, USA	25
The Hon. Gordon Gray	15
The Hon. Richard E. Horner	18
Lt. Gen. T. S. Power, USAF	20
Mr. Paul Sherwood, Hqrs. ARDC	23
Col. Wm. A. Williams, USAF	22
Chemical Corps News, Misc. Items	42
Chemical Corps, Safety Awards	39
Historical Corner ... *By* BROOKS E. KLEBER	44
Military Chemicals Program, The ... *By* KEITH H. JACOBSON	40
Outstanding R.O.T.C. Cadets Who Received A.F.C.A. Awards	29
Sterilization of Sewage by Irradiation	41
Wound Ballistics Laboratory Dedicated	41

ADVERTISERS

Columbia-Southern Chemical Corp.	iii
Delta Chemical Works	35
Diamond Alkali Company	ii
General Tire & Rubber Co.	iv
Harshaw Chemical Co.	19
Koppers Company, Inc.	11
Kuhn, H. A., Consultant	34
Mine Safety Appliances Co.	13
Olin Mathieson Chemical Corp.	7

Published bi-monthly—Jan.-Feb.; Mar.-Apr.; May-June; July-Aug.; Sept.-Oct.; Nov.-Dec.—by the Armed Forces Chemical Association, National Headquarters, located at Suite 819, 2025 Eye St., N.W., Washington 6, D.C. Entered as second class matter at the Post Office at Washington, D.C., under the Act of March 3, 1879. Additional entry at Nashville, Tenn. Subscription price $3.00 per year to members; $6.00 per year to non-members in the United States, Canada and Mexico; elsewhere $1.00 additional for postage. Inquiries concerning circulation and advertising should be addressed to the Secretary-Treasurer.

ARMED FORCES CHEMICAL ASSOCIATION

National Headquarters

408-410 Park Lane Building—2025 Eye Street, N.W.

WASHINGTON 6, D.C.

(Republic 7-6803)

The members of this Association, mindful of the vital importance to national defense of chemistry, allied sciences, and the arts derived from them, have joined together as a patriotic obligation to preserve the knowledge of, and interest in, national defense problems derived from wartime experience; to extend the knowledge of, and interest in, these problems; and to promote cooperative endeavor among its members, the Armed Services, and civilian organizations in applying science to the problems confronting the military services and other defense agencies, particularly, but not exclusively in fields related to chemical warfare. (From Art. II, AFCA Constitution.)

Honorary President
MAJ. GEN. WILLIAM M. CREASY
Chief Chemical Officer, Department of the Army
Washington, D.C.

NATIONAL OFFICERS

Vice President
COL. ROBERT T. NORMAN
(Chairman of Finance Committee)
Washington, D.C.

Vice President
MR. HARRY A. WANSKER
(Chairman of Membership and Organization Committee)
Cambridge, Mass.

Vice President
MR. W. D. WILKINSON
(Chairman of Publications Committee)
Chicago, Ill.

President
MR. GLENN A. HUTT
Cleveland, Ohio

Senior Vice President
BRIG. GEN. CLIFFORD L. SAYRE
USAR
Buffalo, N.Y.

Secretary-Treasurer
LT. COL. OVID E. ROBERTS, JR.
USAR (Ret.)
Silver Spring, Md.

General Counsel
MR. CHARLES E. PLEDGER, JR.
Washington, D.C.

Vice President
COL. JOHN M. MacGREGOR
(Chairman of Meetings Committee)
New York 5, N.Y.

Vice President
DR. RALPH E. GIBSON
(Chairman of Research and Development Committee)
Silver Spring, Md.

Vice President
MR. WALTER E. SPICER, JR.
(Chairman of War Mobilization Planning Committee)
Jersey City, N.J.

Chapter Presidents and Secretaries

ARMY CHEMICAL CENTER—Lt. Col. A. C. Hamilton, *Pres.*; Mr. Philip E. Fisher, *Sec.-Treas.*, Cml. C. Engineering Command, Bldg., 250, Army Chemical Center, Md.

BALTIMORE—Mr. Anthony DePhillips, *Pres.*; Mr. Raymond S. Bailleul, *Sec.-Treas.*, 1418 Third Road, Baltimore, Md.

CINCINNATI—Dr. John Thomas Yoke III, *Pres.*; Mr. Francis L. Diehl, *Sec.-Treas.*, 53 Fleming Road, Cincinnati, Ohio.

CLEVELAND—Mr. Frank Dougherty, *Pres.*; Mr. W. V. Tracy, *Sec.-Treas.*, Monarch Aluminum Mfg. Co., 9301 Detroit Ave., Cleveland 2, Ohio.

DALLAS—Mr. King George Irving, *Pres.*; Major Eugene F. Lennon, Jr., *Sec.-Treas.*, U.S. Army Chemical Procurement Dt., 1114 Commerce St., Dallas, Texas.

FORT DETRICK—Col. Harold A. Chichester, *Pres.*, Headquarters, Fort Detrick, Frederick, Md.

FORT McCLELLAN—Col. Marvin A. Middlebrooks, *Pres.*; M/Sgt. Raymond E. Downward, *Sec.-Treas.*, Office of Secretary, Chemical Corps School, Fort McClellan, Ala.

GEORGIA INSTITUTE OF TECHNOLOGY STUDENT CHAPTER—Mr. W. J. Travis, Jr., *Pres.*, Mr. G. R. Heine, II, *Sec.-Treas.*, 4212 Dale Ave., Tampa, Fla.

MEMPHIS—Mr. Paul J. Traut, *Acting Pres.*, 192 Dille Place, Memphis, Tenn.

MIDWEST—Mr. Evan F. Binkerd, *Pres.*; Mr. James J. Doheny, *Sec.-Treas.*, 86 E. Randolph St., Chicago, Ill.

NEW ENGLAND—Mr. Harry A. Wansker, *Pres.*; Mr. John H. Adams, *Sec.*, 30 Memorial Drive, Cambridge, Mass.

NEW YORK—Mr. W. Ward Jackson, *Pres.*; Mr. Joel Henry, *Sec.-Treas.*, American Inst. of Cml. Engineers, 25 West 45th St., New York, N.Y.

PINE BLUFF ARSENAL—Col. Leonard C. Miller, *Pres.*; Mr. T. H. Foster, *Sec.-Treas.*, 120 West 18th St., Pine Bluff, Ark.

PITTSBURGH—Mr. S. C. Colbeck, *Pres.*; Dr. Charles A. Kiernan, *Sec.-Treas.*, 1524 Pennock Road, Pittsburgh, Pa.

PURDUE UNIVERSITY STUDENT CHAPTER—Mr. Darrell C. Morrow, *Pres.*; Mr. David M. Atkin, *Sec.-Treas.*, 705 N. Chauncey St., W. Lafayette, Ind.

ROCKY MOUNTAIN ARSENAL—Mr. Louis R. Degen, *Pres.*, 1050 South Broadway, Denver, Colo.

SAN FRANCISCO—Mr. Patrick J. Moran, *Pres.*; Mr. R. S. Crowder, *Sec.-Treas.*, 200 Bush St., San Francisco, Calif.

SOUTHERN CALIFORNIA—Col. Samuel P. Pickett, *Pres.*; Maj. Thomas J. McEnery, *Sec.-Treas.*, 131 N. Garfield Ave., Alhambra, Calif.

WASHINGTON, D.C.—Mr. L. Douglas Weiford, *Pres.*, Stauffer Cml. Co., 1500 Mass. Ave., N.W., Washington, D.C.

WILMINGTON—Mr. Ford H. McBerty, *Pres.*; Dr. W. W. Hess, *Sec.-Treas.*, Development Dept., E. I. duPont de Nemours & Co., Wilmington, Del.

A. F. C. A. EXECUTIVE COMMITTEE—1957-58

President
MR. GLENN A. HUTT
Cleveland, Ohio

—Parade

Senior Vice President
BRIG. GEN. CLIFFORD L. SAYRE
USAR
Buffalo, N.Y.

Vice President
COL. ROBERT T. NORMAN
(Chairman of Finance Committee)
Washington, D.C.

Vice President
MR. HARRY A. WANSKER
(Chairman of Membership and Organization Committee)
Cambridge, Mass.

Vice President
MR. W. D. WILKINSON
(Chairman of Publications Committee)
Chicago, Ill.

Vice President
COL. JOHN M. MacGREGOR*
(Chairman of Meetings Committee)
New York, N.Y.

Vice President
DR. RALPH E. GIBSON
(Chairman of Research and Development Committee)
Silver Spring, Md.

Vice President
MR. WALTER E. SPICER, JR.
(Chairman of War Mobilization Planning Committee)
Jersey City, N.J.

Secretary-Treasurer
LT. COL. OVID E. ROBERTS, JR.
USAR(Ret.)
Silver Spring, Md.

General Counsel
MR. CHARLES E. PLEDGER, JR.
Washington, D.C.

* New Member—All others were re-elected at 12th Annual Meeting.

DIRECTORS-AT-LARGE—ARMED

1957

NEW YORK AREA

New York
New Jersey
Pennsylvania

W. T. COFER, JR.
Mine Safety Appliances Co.
Pittsburgh, Pa.

R. W. HOOKER
Hooker Electrochemical Co.
Niagara Falls, N.Y.

DR. DONALD B. KEYES
Nat'l Ass'n of Mfgrs.
New York, N.Y.

NEW MEMBERS

Dr. Alsop H. Corwin
East Central Area

Mr. John J. McDonald
New England Area

Col. Charles H. McNary

Mr. Lewis I. Terry
Mid Central Area

Col. Carl V. Burke

Maj. Claude B. Dykes
South Central Area

Mr. Robert L. Silber
Western Area

SIDNEY D. KIRKPATRICK
Chemical Engineering
New York, N.Y.

DR. W. A. NOYES, JR.
University of Rochester
Rochester, N.Y.

MAJ. GEN. W. N. PORTER
USA (Ret.)
American Cyanimid Co.
New York, N.Y.

EAST CENTRAL AREA

Dist of Columbia, Delaware, Maryland,
Virginia, West Virginia, Ohio

DR. ALSOP H. CORWIN
Johns Hopkins University
Baltimore, Md.

DR. PER K. FROLICH
Chemical Corps
U.S. Army
Washington, D.C.

MAJ. GEN. C. E. LOUCKS
USA (Ret.)
Nat'l Paint, Varnish &
Lacquer Assn.
Washington, D.C.

DR. WALTER J. MURPHY
ACS Applied Journals
Washington, D.C.

BRIG. GEN. MARSHALL STUBBS
Army Chemical Center
Maryland

FORCES CHEMICAL ASSOCIATION

1958

JOHN J. McDONALD
Brown Company
Boston, Mass.

DR. HAROLD C. WEBER
(M.I.T.)
67 Vose Hill Road
Milton, Mass.

NEW ENGLAND AREA

Maine, New Hampshire, Vermont,
Massachusetts, Connecticut, Rhode Island.

MID CENTRAL AREA

Michigan, Indiana, Illinois,
Wisconsin, Minnesota, Iowa,
Missouri.

DR. LELAND I. DOAN
Dow Chemical Co.
Midland, Mich.

(Photo not received by press time)

COL. CHARLES H. McNARY
Chicago Cml. Procurement
District
Chicago, Ill.

LEWIS I. TERRY
Dearborn Chemical Co.
Chicago, Ill.

SOUTH CENTRAL AREA

North Carolina, South Carolina,
Georgia, Florida, Kentucky,
Tennessee, Alabama, Mississippi,
Arkansas, Louisiana.

WESTERN AREA

North Dakota, South Dakota,
Nebraska, Kansas, Oklahoma,
Texas, Montana, Wyoming,
Colorado, New Mexico.

PACIFIC AREA

Arizona, California,
Idaho, Nevada,
Oregon, Utah,
Washington.

COL. CARL V. BURKE
Chemical Corps School
Fort McClellan, Ala.

MAJ. CLAUDE B. DYKES
Pine Bluff Arsenal
Arkansas

ROBERT L. SILBER
Shell Chemical Corp.
Box 2171, Denver, Colo.

MAJ. GEN. E. F. BULLENE
USA (Ret.)
P. O. Box 2968
Carmel, Calif.

A.F.C.A. AFFAIRS

MR. IRVING OF TYLER, TEXAS NOW HEAD OF DALLAS CHAPTER

Mr. King George Irving of Tyler, Texas, was elected President of the Dallas Chapter, Armed Forces Chemical Association, at its meeting on May 15. Mr. Irving is known throughout the Association especially as the donor each year of some 30 to 40 dozen roses from Tyler Texas to decorate the tables at the Association's Annual Banquet. He was among those of his Chapter present at the 12th Annual Meeting in Washington, D.C. last May.

Other newly elected officers of the Dallas Chapter are: 1st Vice President, Lt. Colonel William P. Stone, USAR; 2d Vice President, James Hayes; 3d Vice President, Jack C. Jones; Secretary-Treasurer, Major Eugene F. Lennon, Jr., CmlC; and Chaplain, Richard L. Roden —all of Dallas Texas.

MIDWEST RE-ELECTS OFFICERS

Midwest Chapter reported another year of interesting programs and activities at the Annual Meeting of the Association May 22 in Washington, D.C.

The Chapter is promoting a project for the establishment of proficiency awards to Reserve Units to be marked by the presentation of medals.

The Chapter held three meetings during the year. It presented a gold A.F.C.A. key and tie chain to National Vice President W. D. Wilkinson in recognition of his devotion and services to the Association.

All officers of the Chapter who served last year were re-elected for the 1957-58 year at the meeting held on May 13. They are: President, E. F. Binkerd; 1st Vice President, G. Rumford; 2nd Vice President, H. J. Morley; Secretary-Treasurer, J. J. Doheny. Directors elected were Bruce Humphreville, Morton Hague, Ray G. Sobottka, Charles H. McNary, Lewis I. Terry, and Lt. Col. M. F. Skinner.

A.F.C.A. INDUSTRY GROUP VISITS CHEMICAL CENTER

ARMY CHEMICAL CENTER. MD.—Sixty representatives of industry throughout the eastern part of the nation, most of them members of the New York Chapter of the Armed Forces Chemical Association, were guests of the Army Chemical Center on April 16. They were given a conducted tour of the installation and luncheon at the Officers' Club.

Representing over 30 industrial concerns, the group consisted of top company executives concerned with long-range research and development.

Major General William M. Creasy, Chief Chemical Officer, and Brigadier General Marshall Stubbs, commander of the Army Chemical Center and Chemical Corps Materiel Command, spoke to the group prior to beginning the tour. They explained that the Chemical Corps is proud to have such a representation of industry here and the opportunity to tell and show them how the Chemical Corps is working for the establishment of a more effective national defense system.

Among the visitors were Mr. Glenn A. Hutt, A.F.C.A. president; Col. O. E. Roberts, national secretary, and Mr. W. Ward Jackson, president of the New York chapter.

The tour was followed by a field demonstration of munitions and equipment developed by the Chemical Corps.

GEORGIA TECH CHAPTER HAS SUCCESSFUL YEAR

A.F.C.A. officers and members attending the 12th Annual Meeting were most pleased to learn of the growth and success of the Student Chapter at Georgia Institute of Technology, as reflected in the Chapter's summary of the year's activities for 1956-57. Not only did the Chapter engage in a series of interesting activities during the year, but substantially increased its membership so as to bring formal recognition of the Chapter as an established campus activity. The Chapter now has 28 members.

Activities of the year included a visit to the Chemical Corps exhibit at Fort McPherson, Ga., and a meeting at which Dr. Frederick Bellinger, Assistant Director of the Georgia Tech Experiment Station, was speaker, and a banquet at which Colonel William E. R. Sullivan, Deputy Chief Chemical Officer, was guest of honor.

The Chapter is looking forward to a successful program next year with its newly elected officers who are: President, W. J. Travis, of Jackson, Miss.; Vice President, Hal Reeves, of Tuxedo Park, N. Y., (also President of the Student Body); Secretary-Treasurer, G. R. Heine, II, from Tampa, Fla. Actively interested in the Chapter is Major R. K. Bradford, Chemical Corps, Assistant PMST at Georgia Tech, Faculty Advisor.

INDUSTRIAL COLLEGE COURSE OPEN TO CIVILIAN EXECUTIVES

The Industrial College of the Armed Forces, one of the three Joint educational institutions of the Department of Defense, invites attention to the Correspondence Course which it offers to Regular and Reserve Officers, National Guard Officers, and to civilian executives both in industry and government.

This extension course, "Emergency Management of the National Economy," is designed to reach the civilian community and those members of the military services who cannot attend the Resident Course.

The objective of the Correspondence Course is to educate key personnel to the all-important civilian-military relationship upon which the nation depends, states an announcement recently released by the College. The graduates of this unique course, it is stated, are better informed and therefore more capable of understanding the significance of national in international happenings.

MR. FRED M. JACOBS

Mr. Fred M. Jacobs, who was secretary-treasurer of A.F.C.A. from January 1948 to January 1954, died on June 26 at his home in Washington, D.C. He had been in poor health for several years. He is survived by his wife and a brother, Mr. S. Willard Jacobs of Mt. Vernon, N.Y.

your "rolling pipe line"

More than 2600 Olin Mathieson tank cars are in service every day shuttling between a score of production points and our customers to assure dependable delivery of Mathieson Chemicals.

In a sense, they form a "pipe line" connecting major consuming and producing areas. And, they perform the important function of balancing out local shortages and surpluses.

If you're ever caught short of an essential chemical raw material, the flexibility of a multi-plant producer can prove invaluable. Our "pipe lines" carrying caustic, chlorine, ammonia, sulphuric acid, methanol and organics may be the answer to your supply problems. Talk it over with an Olin Mathieson representative soon.

MATHIESON CHEMICALS

OLIN MATHIESON CHEMICAL CORPORATION

INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD. 3954

MATHIESON

INORGANIC CHEMICALS: Ammonia • Bicarbonate of Soda • Carbon Dioxide • Caustic Potash • Caustic Soda • Chlorine • Hydrazine and Derivatives Hyprochlorite Products • Muriatic Acid • Nitrate of Soda • Nitric Acid • Soda Ash • Sodium Chlorite Products • Sulphate of Alumina • Sulphur (Processed) Sulphuric Acid • ORGANIC CHEMICALS: Ethylene Oxide • Ethylene Glycols • Polyethylene Glycols • Glycol Ether Solvents • Ethylene Dichloride • Dichloroethylether Formaldehyde • Methanol • Sodium Methylate • Hexamine • Ethylene Diamine • Polyamines • Ethanolamines • Trichlorobenzene • Polychlorobenzene • Trichlorophenol

Capitol Photo Service, Inc.

Banquet at Sheraton-Park Hotel, Washington, D. C., May 23. Picture shows part of the group of more than 40 tables.

A. F. C. A. 12th ANNUAL MEETING

Air Force Photo

The Honorable Gordon Gray, Director of the Officer of Defense Mobilization, addressing the Banquet Group at A.F.C.A.'s 12th Annual Meeting.

Air Force Photo

The Singing Sergeants—official chorus of the U. S. Air Force, entertains at the A.F.C.A. Banquet.

Air Force Photo

Meeting Chairman Oliver F. Johnson (left) confers with President Glenn A. Hutt during program break on May 23.

Air Force Photo

A.F.C.A. National Headquarters Group at the "Get-Together" Reception, May 22. (l to r) Vice President Clifford Sayre; Washington Chapter President L. Douglas Weiford; Past President Harry A. Kuhn; Assistant Treasurer Ann Holovach; Arrangements Committee Chairman Don MacArthur.

A.F.C.A.'s 12th Annual Meeting held in Washington, D. C., May 22-23-24, with the Air Force again this year as in 1954 in the role of "host service" produced an extensive and distinguished program elaborating the meeting slogan, "Setting the Sights For Industry."

There were presentations from some 30 representatives of the Armed Services—military and civilian—telling Industry what the Services need and hope to obtain from it in the way of improved or entirely new materials and other chemical products for armament and equipment.

These discussions of Service requirements and descriptions of the administrative organizations and procedures involved in planning and developing them, dealt not only with the Service needs of today, but took account also of the future as it can be foreseen on the basis of current technological developments and trends.

The program set a precedent as a truly "integrated" one, in line with the broad interests of the Association. All three of the Armed Services—Army, Navy and Air Force—participated on approximately equal terms as to program time. Another especially noteworthy feature of the gathering this year was the provision, following the regular two-day schedule which was carried out at the Sheraton-Park Hotel, of an additional classified meeting on the third day. In that program also, which was conducted under Air Force auspices at nearby Andrews Air Force Base, all three Services participated.

In addition to the wealth of matter of essentially professional concern to military and industrial representatives, the meeting brought several addresses by distinguished speakers bearing upon topics of current public interest. Of signal importance was the address of The Honorable Gordon Gray, Director of the Office of Defense Mobilization, the guest speaker at the banquet. Some four to five hundred Association members and guests had gathered for this occasion at the Sheraton-Park grand hall on the evening of May 23.

Hon. Gordon Gray's Address

DIRECTOR Gray's prepared speech is presented in full in this issue of the Journal, but it impels at least brief reference to some of its highlights here. He declared that economic strength does not in itself insure political and military security. He alluded to the advances of the USSR in scientific and technical education and stated the measures he believes necessary for the United States to maintain a position of technological superiority. Referring to the problems of world security created by the nuclear age, he emphasized efforts to reduce world tensions and promote economic wellbeing among all peoples as the routes of "major advance" toward their solution. Considering the dire consequences of a thermonuclear war, Mr. Gray said the traditional concept of a "mobilization base" is no longer adequate, indeed, that planning to cope with nuclear problems of such magnitude as fallout points rather to a need for what he termed a "survival base." Mr. Gray concluded with some description of the role and activities of the ODM— to which office he was recently appointed as Director, remarking that the public is not sufficiently informed about it.

Official Air Force Welcome

THE official address of welcome to the Association on behalf of the Air Force as "host service" was given by The Honorable Richard E. Hornor, Acting Assistant Secretary of the Air Force for Research and Development. Speaking at the morning session on May 23, Mr. Horner's address, printed herein, touched also on various aspects of national defense and thus was of consideration additional interest. Referring to the functions and concerns of A.F.C.A., he said, "it is not surprising that the Defense establishment has decided as a matter of policy to support and to help sponsor the activities of your organization."

ANOTHER speech in the Air Force group containing matters of much interest as well as of special significance for both Industry and Armed Services was that of Lt. General Thomas S. Power, Commander of Air Research and Development Command. General Power's address which had been given an advance label merely of "Introductory Remarks" to the Air Force portion of the program, is also printed in this issue. Speaking of the "mounting cost of military research and development", he said—"We are approaching the point where we can no longer maintain the present pace of technological progress without seriously affecting our civilian economy." He then added that the Air Force wishes to encourage Industry to "return to the principle . . . of financing its own research and development projects, even those considered to be of primary military interest."

In line with the idea of such encouragement of industry in respect to military research and development, were several of the presentations that followed in the Air Force group.

Colonel William A. Williams, Chief of the Programs Office, of ARDC, told of the Air Force "Technical Program Planning Documents," and of the existing administrative procedures whereby these generally classified papers can be made available to qualified industrial concerns. These documents, relating to research and development requirements, also provide an insight into the thinking and military philosophy which underlie the projects specified. From comments heard it appears that this informative discussion by Colonel Williams was of much interest to both military and industrial members and the speech is therefore made of permanent record here.

Proprietary Rights Discussed

STILL another address in the Air Force period of much interest in connection with research and development on military projects was that of Mr. Paul Sherwood, Chief Patents Division, Office of the Staff Judge Advocate, Hqrs. ARDC, speaking on "Proprietary Rights." It appears that this subject has involved some perplexing questions which have caused the Defense Dept. to produce a new Regulation aimed at resolving them. Mr. Sherwood's address dealt with the provisions of that document, and in view of the considerable interest expressed by many members present and calls for copies of the speech after his delivery of it, it too is published in this issue.

Lt. Colonel C. R. Tosti, USAF, Assistant Executive Officer at ARDC Headquarters in Baltimore, discussed the ARDC organization, using projector slides to show the far-flung geographical distribution and diversified character of ARDC's various major establishments, called Centers.

Mr. Warren Baker, former pilot who flew with the British, French and later with the American Air Force in World War I, and who now is employed in ARDC's Headquarters in Baltimore as Chief of the Technical Industrial Relations and Innovations Division, was the next speaker on the Air Force list. Mr. Baker told of the extensive procurement requirements and activities of his Division and outlined procedures to facilitate industrial

contractual relationships with the Air Force on research and development matters.

Colonel J. C. Carmichael and Major R. P. deTreville, of the Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, each gave presentations under the title of "Toxicological Warning Systems." Their papers dealt with the problems of industrial and other operational hazards in connection with the manufacture and use of Air Force material. Colonel Carmichael is Chief of the Engineering Branch and the Enviromental Health Laboratories Branch, Office of the Surgeon, Headquarters Air Materiel Command. Major deTreville is a Medical Consultant to Air Materiel Command's Environmental Health Laboratories, and Deputy Chief, Medical Specialties Branch, Headquarters, Air Materiel Command at Wright-Patterson Air Force Base, Dayton, Ohio.

[It obviously is impracticable to print or even adequately to review all of the numerous presentations at this meeting in this issue of the Journal. Therefore as opportunity arises, it is planned to extend the Journal report of this meeting to future issues.—Ed.]

Another Colonel Williams of ARDC, Colonel Leslie B. Williams, officiated as Chairman of the Air Force sessions on May 23. His introductions of speakers and accompanying comments added materially to interest in this part of the program. Colonel Leslie Williams is Director of Research stationed at ARDC Headquarters in Baltimore.

The Army's R&D Program

THE afternoon session of May 23 opened with an introduction of the Army's part of the program by Major General J. P. Daley, U. S. Army, Director of Special Weapons, in the Office of Research and Development, Office of the Chief of Staff, U.S. Army, Washington, D.C. Noting that the excellent Chemical Corps presentations which had already been given on the opening day, May 22, were part of the Army's program, General Daley referred to the other important areas of Army interest in chemical research and development. He took occasion to point out that virtually all forms of warfare are chemical in the sense that modern weapons and military equipment depend largely on chemical applications and processes. This, he said, had been the case ever since a cave-man first applied chemistry to warfare by burning the end of a sharpened stick to harden it for use as a weapon.

General Daley then introduced Colonel J. A. Ord, Chief of Research Division, Research & Development Headquarters, U.S. Army. Colonel Ord told of the Army's recognition of the importance of military research and development as reflected in the provision of a top level R&D staff agency in the reorganization of the Department of the Army after World War II. Colonel Ord's presentation was extensively illustrated with lantern slides and embraced the specific fields of scientific interest and research of the various Technical Services of the Army.

The Army program for the afternoon session on May 23 concluded with an illustrated talk by Dr. R. G. Tischer, Director of the Quartermaster Food and Container Institute, Food Laboratories, Chicago, Illinois. In this discussion Dr. Tischer told of the work being done on the development of specially designed and packaged rations for troops, both in the case of the individual soldier and for the highly mobile small units adapted to the atomic age.

Navy Tells of Chemical Needs

THE Navy's part of the program was presented under the chairmanship of Dr. L. W. Butz, Head of the Chemistry Branch, in the Office of Naval Research, Washington, D. C. The Navy presentations emphasized the need for new materials, improved coatings, preservatives and other chemicals for naval construction and operation of ships and aircraft and shore installations. Generally typical of these presentations was that of Commander A. B. Chilton, Manager of the Atomic Energy Branch, Research Division, Bureau of Yards and Docks, Washington, D. C. Commander Chilton pointed out specific problems bearing on chemical development possibilities as a challenge to the chemical industry. His address is published in this issue.

Captain B. F. Bennett, Head of Materials Development, R&D Division, of the Bureau of Ships, Washington, D.C., in his address, also dealt extensively with requirements for new chemical developments for use in modern ship construction and operation. His presentation was made with numerous projector slides and, therefore, could not readily be reproduced in print.

The Navy's part of the program at the Sheraton-Park was concluded with a talk by Mr. F. P. Somers, Head of the Chemicals Section in Bureau of Aeronautics, Washington, D. C. Mr. Somers, long associated with aircraft development both with the Air Force and with industry, served as a Commander during World War II. His speech dealt especially with chemical needs for cleaning and maintenance and operation of airplanes. He referred to the U.S. Navy Air Force as said to be the third largest in the world, stating it operated some 9,000 aircraft of which 4,500 are given complete overhaul every year.

The Chemical Corps Program

ALL three of the Armed Forces Secretaries sent letters of greeting on the occasion of the meeting to President Glenn A. Hutt. That of Secretary of the Army Wilber M. Brucker was of particular interest for it might well have served as a general introduction to the Army Chemical Corps' part of the program. Secretary Brucker in his letter gave significant recognition to its broad scope, stating, in that connection, "The Army's Chemical Corps will logically occupy a large share of your interest and time at this meeting, because of its essentially tri-Service mission and responsibilities."

The Chemical Corps program was carried out on May 22, the first day of the meeting, almost the entire afternoon of that day being devoted to it. Mention of it last in this resumé has nothing to do with its merit but is due simply to the general reverse order of events which has been adopted for this report.

The Chemical Corps program was well received, smoothly and ably carried out. It was not confined entirely to the Research and Development function, as was generally the case with the other major subdivisions of the meeting schedule. It reflected all of the fields of activity of the Corps—operations and training; research and development; materiel, and engineering.

Major General William M. Creasy, Chief Chemical Officer of the Army, opened the session with a speech entitled "The Forward Look in the Army Chemical Corps." He expressed his conviction that "weapon systems in the particular province of the Army Chemical Corps must be developed on a par with those of other systems."

In another passage relating to the importance of the Chemical Corps' role, he said, "I have tried to show that the Chemical Corps is going forward and that we do not

Unsinkable 42-pound DYLITE® plastic float supports 20 times its own weight!

The 36"-diameter plastic float was made in halves by placing a quantity of DYLITE beads in a mold (a section of the mold is shown to the right) and applying heat. The tiny plastic beads expanded to fill the entire mold with a strong, lightweight sphere.

The Navy needed a tough, lightweight float to support equipment weighing over 800 pounds. Additional requirements: the float must withstand a fall into the ocean, be easy to fabricate and float indefinitely.

After careful consideration, Navy scientists chose DYLITE expandable polystyrene for the float.

DYLITE, the foamed plastic introduced by Koppers, has found many unusual applications. Tests have shown this extremely lightweight material ideal as a buoyancy agent. It is strong, waterproof, resilient, easy to mold into any shape required, is virtually unsinkable and low in cost.

For more information, write to the Koppers Company, Inc., Chemical Division, Dept. AF-17, Pittsburgh 19, Pennsylvania.

KOPPERS

KOPPERS PLASTICS

Sales Offices: PITTSBURGH • NEW YORK • BOSTON • PHILADELPHIA • ATLANTA • CHICAGO • DETROIT • HOUSTON • LOS ANGELES • SAN FRANCISCO

In Canada: Dominion Anilines and Chemicals Ltd., Toronto, Ontario

subscribe to any beliefs that chemical and biological warfare systems are outmoded and obsolete because of developments in the atomic field."

Following General Creasy's talk, which is published herein, he introduced to the audience the top members of his staff.

Brigadier General J. H. Rothschild, Commanding the Research and Development Command of the Corps, introduced the research and development part of the program. This included a talk by Dr. E. A. Metcalf, Industrial Liaison Office of the Army Chemical Warfare Laboratories, Army Chemical Center, Maryland. Dr. Metcalf discussed the role and functions of that office in inviting technical information and suggestions from commercial and other research agencies outside the Government which are of possible interest to the Chemical Corps, particularly discoveries of new toxic compounds. Dr. Metcalf also reviewed and emphasized the measures adopted by the Corps for safeguarding confidential information given to the Corps under the industrial liaison program.

Dr. Metcalf was followed by Dr. A. G. Wedum, Safety Director of the Army Chemical Corps Biological Warfare Laboratories at Fort Detrick, Md. Dr. Wedum dealt at some length with the special safety measures of this installation which enjoys an outstanding record for industrial safety. He had planned to illustrate his lecture with a number of lantern slides but, finding the projector at hand unsuitable for them, he managed very effectively to fill in the gaps with "word pictures" in lieu of the slides.

Brigadier General Marshall Stubbs, Commanding General, Army Chemical Center and the Materiel Command of the Corps, introduced the procurement feature —a panel-skit somewhat along the lines of a TV quiz program. This dealt with current procurement problems as they affect both small and large industrial contractors. The "moderator" of the quiz was Major Harold E. McCue. Mr. Hearn Fredericks had the role of Government Contracting Officer, while the quiz panel consisted of Captain Paul Koenig, representing "Gigantic Enterprises;" Mr. Asher Z. Cohen, of the "Job Shop Co.;" Mr. Alfred Cook of "Small & Sons," and Mr. Stan Klinek of "Metal Fabricators, Inc."

Colonel William J. Allen, Commander of the Chemical Corps Engineering Command, followed with two presentations dealing with the function of an Associate Project Engineer in the engineering work of the Corps, and current methods in the use of machine card records in connection with conducting and recording surveillance of military items held in depot storage.

Board of Directors Meeting

On the morning of May 22, while registration of incoming guests was still going on, the Annual Meeting of the Board of Directors of the Association was held. The Board received and approved the Treasurer's report, discussed the various matters of Association administration, and approved continuation of the Science Teacher Award program. All the Association's officers during the past year were re-elected, with the exception of Mr. Oliver F. Johnson, Vice President and Chairman of the Meetings Committee. Mr. Johnson was not a candidate for re-election, and in his place Colonel John M. MacGregor, New York attorney, who served in the Chemical Corps during World War II, was elected.

While the Annual Meeting program was essentially a serious one, there were several notable "time out" periods for entertainment. A general "get-together" reception with refreshments was held on the first evening of the meeting, May 22. 1957 marks the Golden Anniversary of the Air Force and special note of this was taken at the meeting and in the May-June issue of the Journal.

At the President's reception and the Annual Banquet there were a number of distinguished guests.

The seating list for the two-tier head table at the banquet, in addition to the specially invited guests, included President Hutt, General Chairman Johnson and other national officers and officials of the Association, the president of the Washington, D.C. Chapter and the chairmen of the various 12th Annual Meeting committees.

The list in alphabetical order of names follows:

Rear Admiral Rawson Bennett, Chief of Naval Research, Executive Office of the Secretary, Department of the Navy;

Major General I. M. Bethel, Quartermaster General, U.S. Marine Corps Headquarters;

Major General William M. Creasy, Chief Chemical Officer, U.S. Army;

Major General John P. Daley, Office Chief of Research & Development, Office of the Chief of Staff, U.S.A.;

Dr. Per K. Frolich, Deputy Chief Chemical Officer for Scientific Activities, Office of the Chief Chemical Officer, U.S.A.;

Lt. General James M. Gavin, Jr., Chief of Research & Development, U.S. Army;

The Honorable Gordon Gray, Director of the Office of Defense Mobilization, Executive Office of The President;

Brigadier General H. F. Gregory, Commander of the Office of Scientific Research, Hollingsworth Air Force Base;

Major Winifred Ham, Chief Industrial Security Branch, Army Chemical Center;

Miss Anna A. Holovach, Assistant Treasurer, A.F.C.A.;

Mr. Glenn A. Hutt, President of A.F.C.A.;

Lt. General Leon W. Johnson, USAF, U.S. Representative to the Military Committee and Standing Group, NATO;

Mr. Oliver F. Johnson, Vice President-Chairman of Meetings Committee, A.F.C.A., General Chairman of 12th Annual Meeting;

Colonel Harry A. Kuhn, USA (Ret.), Past President of A.F.C.A., Chairman Program Advertising Committee 12th Annual Meeting;

Major General Charles E. Loucks, USA (Ret.)

Mr. Donald MacArthur, Chairman, Registration, Welcome and Physical Properties Arrangements Committee 12th Annual Meeting;

Colonel John C. MacArthur, USA (Ret.), Editor, Armed Forces Chemical Journal;

Dr. William H. Martin, Director of Research & Development, Office of the Secretary of the Army;

Major Marion A. Marvin, Jr., USAF, Office of the Deputy Chief of Staff, Materiel, Hq. USAF;

Colonel Edward Mikolowski, USAF, Executive to the U.S. Representative, Military Committee and Standing Group, NATO;

Lt. Colonel Sanford K. Moats, USAF, Office of Information Services, Office of the Secretary of the Air Force;

Mrs. C. B. Momsen, Chairman, Ladies Program Committee of 12th Annual Meeting;

Colonel Robert T. Norman, Vice-President-Chairman of Finance Committee A.F.C.A.., Chairman Program Printing Committee, 12th Annual Meeting;

Mr. D. E. Oyster, Deputy for Requirements, Office of Assistant Secretary of the Air Force (R&D);

Mr. Charles E. Pledger, Jr., General Counsel, A.F.C.A.

Lt. Colonel (Chaplain) Stanley M. Powers, USAF;

Lt. Colonel O. E. Roberts, Jr., USAR (Ret.), Secretary-Treasurer, A.F.C.A.;

Dr. Ragnar Rollefson, Chief Scientist, Department of the Army;

Brigadier General Clifford L. Sayre, Senior Vice-President, A.F.C.A.;

Commander Henry E. Schmidt, USN, Office of Naval Material, Office Secretary of the Navy;

Mr. Jacob M. Skilken, High School Chemistry Teacher, Cincinnati, O., winner A.F.C.A. Science Teacher Award for 1957;

Mr. Walter E. Spicer, Jr., Vice President, Chairman War Mobilization Planning Committee, A.F.C.A.;

Colonel William E. R. Sullivan, USA, Deputy Chief Chemical Officer, Office of the Chief Chemical Officer, Department of the Army;

Dr. G. P. Vincent, Chairman Publicity Committee, 12th Annual Meeting;

Mr. Harry A. Wansker, Vice President-Chairman, Membership & Organization Committee, A.F.C.A.

Mr. L. Douglas Weiford, President of the Washington Chapter, A.F.C.A.

Mr. W. D. Wilkinson, Vice President-Chairman Publications Committee, A.F.C.A.

Captain Nancy B. Wood, Office of the Chief Chemical Officer, Department of the Army.

Entertainment Features

ENTERTAINMENT during the banquet was provided by presentations from a number of highly talented musical groups of the Air Force. These included the "Bagpipers," the "Strolling Strings" and the "Singing Sergeants." The Air Force "Jumping Jacks," another entertainment group known as "A Show Within a Band," appeared on another portion of the program.

For the ladies attending the meeting there was a full day's program consisting of a bus-tour of places of interest in Washington and luncheon at the Officers Club, Naval Gun Factory. Mrs. Charles B. Momsen, wife of Vice-Admiral Momsen, USN (Ret.) was chairman of the ladies entertainment committee.

The Chairman of the general committee for the meeting and its chief architect was Mr. Oliver F. Johnson, Vice-President of the Association, and Chairman of The Meetings Committee. Mr. Johnson is Executive vice-president, Engineering Design, Adache Associates, Inc., Cleveland, O., and also Manager, Dualex Division, Bell & Gossett Company, Morton Grove, Ill.

President Hutt of A.F.C.A., vice president of the Ferro Corporation, Cleveland, was Chairman Ex-officio and Lt. Col. Sanford K. Moats, USAF was the "Project Officer".

The special committees were:

Arrangements: Mr. Donald Mac Arthur of Koppers Company, Inc., Mr. Carroll W. Hayes of the Celanese Corporation of America, Mr. G. Robert Sido of Monsanto Chemical Company, and Mr. L. Douglas Weiford of Stauffer Chemical Company.

Banquet Program: Mr. Oliver F. Johnson, and Rear Adm. N. S. Prime, USN (Ret.) Immediate Past President, A.F.C.A.

Printing: Col. Robert T. Norman, USAR, of Auchincloss, Parker & Redpath, and Maj. Gen. Charles E. Loucks, USA (Ret.) National Paint, Varnish & Laquer Association, Inc.

Program Advertising: Col. H. A. Kuhn, USA (Ret.) Consultant.

Publicity: Dr. C. P. Vincent, Olin Mathieson Chemical Corporation, Capt. Paul I. Bauman, Baltimore "News-Post" and Mr. Robert G. Gibbs, "Analytical Chemistry."

Ladies Entertainment: Mrs. Charles B. Momsen, Mrs. Oliver F. Johnson, Mrs. Glenn Hutt, Mrs. John C. MacArthur and Mrs. Charles Pledger.

MISS HOLOVACH HONORED BY SECRETARIES ASSOCIATION

Miss Ann Holovach, Assistant Treasurer of A.F.C.A., and an active member of the National Secretaries Association (International), was elected President of the Presidential Chapter, Washington, D.C., of that organization on May 15. A special installation ceremony was scheduled to be held on June 19.

Miss Holovach was born on a farm near the town of Copeland on the plains of Western Kansas. After graduation from high school at Sublette, Kans., where she was valedictorian of her class, she attended business college at the Dodge City Commercial College. She later received a degree of Bachelor of Commercial Science in Accountancy from Benjamin Franklin University in Washington, D.C. through studies carried out in night school.

Miss Holovach has been on the staff of Hq. A.F.C.A. since March 1953. Her family home is now at Garden City, Kansas.

M-S-A

SAFETY HEADQUARTERS FOR THE CHEMICAL INDUSTRY

M-S-A CO Tester

M-S-A Explosimeter

M-S-A Combustible Gas Alarms

M-S-A LIRA Gas and Liquid Analyzer

- Gas Masks
- Respirators
- Head Protection
- Face Shields
- Protective Clothing
- First Aid Kits

There's a wide line of M-S-A equipment available for maximum safety and protection against all chemical and industrial hazards. M-S-A has an answer for your every safety problem!

MSA SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue
Pittsburgh 8, Pennsylvania

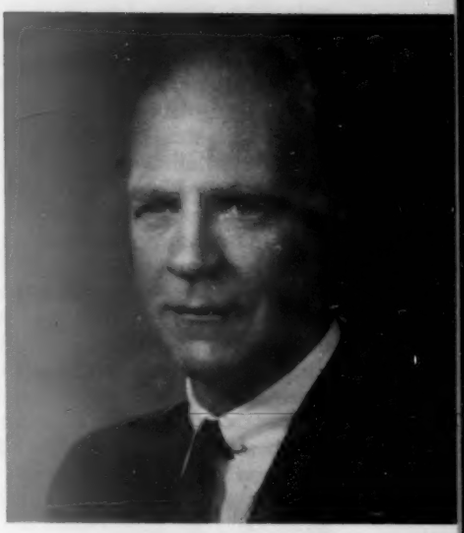
GROUP AND SUSTAINING MEMBERS

OF THE ARMED FORCES CHEMICAL ASSOCIATION

Abbott Laboratories, North Chicago, Ill.
Adache Associates, Inc., Engineers, Cleveland, Ohio
Air Reduction Company, Inc., New York, N.Y.
Allied Chemical & Dye Corporation, New York, N.Y.
American Cyanamid Company, New York, N.Y.
American Zinc, Lead & Smelting Co., St. Louis, Mo.
Armour & Company, Chicago, Ill.
Armstrong Cork Company, Lancaster, Pa.
Astra Pharmaceutical Products, Inc., Worcester 6, Mass.
Atlas Powder Company, Wilmington, Del.
Baker & Company, Inc., Newark, N.J.
Baker, J. T., Chemical Company, Phillipsburg, N.J.
Barnebey-Cheney Company, Columbus, Ohio
Bechtel Corporation, San Francisco, Calif.
Becton, Dickinson and Company, Rutherford, N.J.
Bell & Gossett Company, Morton Grove, Ill.
Blaw-Knox Company, Pittsburgh, Pa.
Blickman, S., Inc., Weehawken, N.J.
Borden Company, The, Philadelphia, Pa.
Bridgeport Brass Company, Bridgeport, Conn.
Brown Company, Berlin, N.H.
Burroughs Wellcome & Co. (U.S.A.) Inc., Tuckahoe, N.Y.
Casco Products Corporation, Bridgeport, Conn.
Celanese Corporation of America, New York, N.Y.
Central Foundry Company, The, Newark, N.J.
Chamberlain Corporation, Waterloo, Iowa
City Chemical Corp., New York, N.Y.
Columbia-Southern Chemical Corp., Pittsburgh, Pa.
Commercial Solvent Corporation, New York 16, N.Y.
Continental Can Co., Inc., Chicago, Ill.
Continental Oil Co., Ponca City, Okla.
Crane Co., Chicago, Ill.
Diamond Alkali Company, Cleveland, Ohio
Dow Chemical Company, Midland, Mich.
E. I. duPont de Nemours & Co., Inc., Wilmington, Del.
Edo Corporation, College Point, N.Y.
Eldon Manufacturing Company, Los Angeles, Calif.
Esso Research and Engineering Co., New York, N.Y.
Evans Research & Development Corp., New York, N.Y.
Federal Laboratories, Inc., Saltsburg, Pa.
Ferguson, H. K., Company, The, Cleveland, Ohio
Ferro Corporation, Cleveland, Ohio
Firestone Industrial Products Co., Fall River, Mass.
Fisher Price Toys, Inc., East Aurora, N.Y.
Fisher Scientific Co., New York, N.Y.
Fluor Corporation, Ltd., The, Whittier, Calif.
Food Machinery & Chemical Corporation, New York, N.Y.
Foster Wheeler Corporation, New York, N.Y.
Fraser & Johnston Co., San Francisco, Calif.
General Aniline & Film Corporation, New York, N.Y.
General Electric Company, Chemical & Metallurgical Division, Pittsfield, Mass.
General Tire & Rubber Company, The, Wabash, Ind.
Goodrich, B. F., Chemical Company, Cleveland, Ohio
Goodyear Tire & Rubber Company, Akron, Ohio
Grace Chemical Company, New York, N.Y.
Gray Stamping & Manufacturing Co., Plano, Ill.
Handy & Harman, New York, N.Y.
Harshaw Chemical Company, The, Cleveland, Ohio
Harvey Machine Co., Inc., Torrance, Calif.
Hercules Powder Company, Wilmington, Del.
Heyden Newport Chemical Corporation, New York, N.Y.
Hooker Eletrochemical Company, Niagara Falls, N.Y.
Industrial Rubber Goods Company, St. Joseph, Mich.
International Nickel Co., Inc., New York, N.Y.
International Salt Co., Inc., Scranton, Pa.
International Silver Company, The, Meriden, Conn.
Jefferson Chemical Company, Inc., Houston 1, Texas
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Kennecott Copper Corporation, New York, N.Y.
Kilgore, Inc., Westerville, Ohio
Koppers Company, Inc., Pittsburgh, Pa.
Lambert-Hudnut Mfg. Laboratories, Inc., Lititz, Penna. subsidiary of Warner-Lambert Pharmaceutical Company, St. Louis, Mo.
Eli Lilly and Co., Indianapolis 6, Ind.
Little, Arthur D., Inc., Cambridge, Mass.
Mason, L. E., Company, Hyde Park, Mass.
Merck & Company, Inc., Rahway, N.J.
Miles Laboratories, Inc., Elkhart, Ind.
Mine Safety Appliances Co., Pittsburgh, Pa.
Minnesota Mining & Manufacturing Co., 900 Fauquier Avenue, St. Paul, Minnesota
Miracle Adhesives Corp., 250 Pettit Ave., Bellmore, Long Island.
Monarch Aluminum Mfg. Co., Cleveland, Ohio
Monsanto Chemical Company, St. Louis, Mo.
Niagara Blower Co., New York, N.Y.
Olin Mathieson Chemical Corp., East Alton, Ill.
Oronite Chemical Company, San Francisco, Calif.
Parsons, Ralph M., Company, The, Los Angeles, Calif.
Pemco Corporation, Baltimore, Md.
Penick, S. B., & Company, New York, N.Y.
Pennsalt Chemicals Corporation, Philadelphia, Pa.
Pfizer, Chas. & Company, Inc., Brooklyn, N.Y.
Phillips Petroleum Company, Bartlesville, Okla.
Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.
Proctor & Gamble, Cincinnati, Ohio.
Reynolds Metals Company, Louisville 1, Ky.
Scovill Manufacturing Company, Waterbury, Conn
Shea Chemical Corp., Jeffersonville, Ind.
Shell Chemical Corp., Denver, Colo.
Shell Development Company, Emeryville, Calif.
Sheller Mfg. Co., Dryden Rubber Div., Chicago, Ill.
Shwayder Bros., Inc., Denver, Colo.
Standard Oil Company (Indiana), Chicago, Ill.
Stauffer Chemical Company, New York, N.Y.
Sun Oil Company, Philadelphia, Pa.
Union Carbide & Carbon Corp., New York, N.Y.
United-Carr Fastener Corp., Cambridge, Mass.
United States Rubber Company, New York, N.Y.
Universal Match Corp., Ferguson, Mo.
Vitro Corporation of America, New York, N.Y.
Vulcan-Cincinnati, Inc., Cincinnati, Ohio
Warner-Chilcott Laboratories, Morris Plains, N.J
Witco Chemical Company, Chicago, Ill.
Wyandotte Chemicals Corp., Wyandotte, Mich.
Zaremba Company, Buffalo, N.Y.
Zenith Aircraft, Div. of Zenith Plastics Co., Gardena, Calif.

Companies listed in bold face type are Sustaining Members

DEFENSE MOBILIZATION



Address at the Annual Banquet of its 12th Annual Meeting, A.F.C.A. at Sheraton-Park Hotel, Washington, D. C. on May 23, 1957

By THE HONORABLE GORDON GRAY
Director, Office of Defense Mobilization

(Economic strength in relation to military security; the revolutionary effect of nuclear weapons development on the security problem; the requirements for maintaining technological superiority; the need, in terms of thermonuclear war, for a "survival base" concept; defense planning functions and activities of ODM and need for greater public understanding of ODM's role in the Government—are among matters of compelling interest discussed by Mr. Gray)

I AM pleased to appear before you this evening to talk about defense mobilization because I know of your deep interest in and commitment to our national defense. As you know, I have worked on problems of national defense from both sides of the Potomac, so I hope that I can make a contribution to your thinking on this subject. Since you have spent the day talking about research and development, I would like to touch on some broad aspects of our national economic and technological posture, before telling you about what we are doing on this side of the river for the national defense.

When you think of the Office of Defense Mobilization you probably are immediately reminded of the Korean War, when this Office was first established, and of the vast panoply of controls and expansion programs which was created for that conflict. The controls went out in 1953 and we are near the end of most of the expansion programs. Today there are only eight open expansion goals under which industry is eligible for rapid tax amortization assistance, out of 229 established since 1951. We are examining several of the remaining goals to see if they too should be closed. But I might indicate that one goal we do not contemplate closing at this time is that covering new research and development laboratories.

The Korean-period defense mobilization program constituted an effort by the Government to superimpose upon a basically free-enterprise civilian economy, the peculiar needs of military security. This required a general expansion so that the increased military requirements could be met in addition to the large and growing consumer demands; it also required the selective expansion achieved through the rapid tax amortization incentive. That period is over now. The government is still encouraging a continuing growth of the entire economy, but now primarily through normal economic processes, however, rather than through defense incentives. This over-all growth has been substantial, as you know. From the beginning of 1953 to the beginning of this year, civilian employment increased by about 3.7 million; business firms and farmers spent over $150 billion to increase capacity and replace worn out facilities, and gross national product, in constant dollars, rose about 12.5%.

Maintenance of a high level, growing economy at home, and support of military sufficiency, and of economic development and growth among the free nations abroad, are cornerstones of our national security policy and of our efforts to preserve and strengthen world peace. Let us look for a moment at why this is so.

Historically economic expansion in the United States has occurred at a rate of about 3% a year. In the period since World War II, however, our national income has increased at an average annual rate of about 4%; our rate of investment has been about 12-13% of annual national income. This economic growth, impressive as it has been, nevertheless represents a slower rate of growth than, for example, the heavily regimented Soviet economy has undergone. The rate of investment in the USSR has been estimated at 20 to 23% of annual national income, and the Soviet increase in national product has been estimated as running at a rate of from 5 to 8%. This difference is not so serious as it sounds. The Legislative Reference Service pointed out a couple of years ago in its study on *Trends in Economic Growth*, that an examination of the various factors of production in the United States and in the Soviet Union, gives strong grounds for expecting that the absolute gap in the size of the two economies will widen over the next two decades, even though the rate of growth is higher in the Soviet Union than in the United States. This is so because we start from so much higher a level.

SUPERIORITY in economic strength is a desirable end in itself, but it does not assure political and military security. In fact, an economy that is already largely mobilized for war can operate with great effectiveness, and for some time, against a considerably stronger economy that is not so geared. The low levels of consumption restricted for civilians in the USSR are an element of military strength since they enable a much larger proportion of basic production to go for military purposes than is the case in the United States. The USSR, by keeping up with Western technology and by concentrating its best brains and whatever resources were necessary, has achieved notable advances in important military fields such as atomic energy, aircraft and guided missiles.

In the past, many of us in the United States have comfortably assumed that we had a clear technological superiority over the rest of the world. There have been, however, growing indications that this superiority is disappearing. In fact, in a number of critical areas there are those who believe that our problem is no longer one of maintaining but rather one of achieving technological superiority.

The Russians are most probably devoting a much larger proportion of their scientific and technical resources to military research and development than we. They have placed great stress on the training of scientists, engineers, and technicians, and are currently graduating specialists of comparable quality at a faster rate than we are. The implications of this rate may be more significant than the rate at which the Russians currently are expanding capacity in their basic industries.

In order for the United States to maintain technological superiority at least two conditions must be met. First, we must maintain throughout our society the dynamic, creative and highly trained individuals and groups necessary for the healthy growth of society as a whole. Far more action is needed to insure the steady flow of highly competent and trained young people into those fields which are crucial to our military leadership. Basic research will require additional resources. In the last several years American industry has substantially increased its support of higher education in this country but a great deal more is still needed.

Second, we must effectively direct the resources made available for defense in order to shorten the time required to design, develop, produce and place new weapons and counter-weapons in the hands of our military services. This will require intensive efforts to solve organizational, procedural, and resource management problems not only in government but also in our defense industries and research and development laboratories.

I would like now to turn to some of the problems of national—and world—security created by the nuclear age. It is the responsibility of ODM to deal with a goodly number of them.

First of all, let me emphasize that the major advance toward solution of these problems will come from efforts to reduce world tensions and promote economic well-being for all peoples of the world. We would thus create conditions that measurably lessen the possibility of war, nuclear or otherwise.

But until these conditions obtain, we must, in all prudence, study the problems and make some preparations to deal with them.

The greatest security problems faced by the world today are the result of a technological breakthrough on atomic fission little more than a decade ago. During the last twelve years, the development and accumulation of nuclear and thermonuclear weapons have revolutionized the problem of national security. These weapons, a few years after their invention, have for the first time made it feasible to achieve quick destruction of economies and populations. Fundamentally new problems have thereby been created. We have scarcely had time to learn what they are, much less how to think about them.

We must assume that the Soviet Union will continue its efforts to match us in nuclear strength. Some day, as Churchill has suggested, a "balance of terror" may replace a balance of power. Undoubtedly, this prospect, as well as economic conditions at home, has influenced the leaders of Soviet Russia in their sporadic gestures during the last couple of years toward the reduction of tensions and a settlement of some of the outstanding problems of the cold war. Nothing must stand in the way of our acting affirmatively, whenever possible, to promote the creation of conditions which will lessen the catastrophic possibility of World War III.

Nevertheless, at least until such time as the major areas of tension are eliminated, arms are reduced, and a scheme to prevent surprise attack is adopted, we must continue our defensive preparations. We must be prepared to respond effectively to two very different military situations: a massive thermonuclear war of potential mutual destruction, or a series of limited-scale, limited-objective wars such as have been fought in many parts of the globe since the end of World War II. If we are not prepared to fight little wars to defend the rest of the free world, as we had to in Korea, then we may be faced with a series of piecemeal surrenders which could lead to loss of much of the free world and a final tipping of the scales to Communism. If we are prepared to deal with only one kind of war, we could be destroyed by the other.

Our present mobilization base is generally adequate to oppose local aggressions like Korea. We fought the Korean war on a guns-and-butter economy; with some tightening of our belts we could manage the mobilization of resources to fight a considerably larger war. Less important than the mobilization base for this kind of war is the military base which must be flexible, adequate, and always ready.

Thermonuclear warfare presents an entirely different and exceedingly more difficult problem.

In terms of a thermonuclear war, our traditional concept of the mobilization base is no longer adequate. By and large, the mobilization base has been expanded with relatively little consideration of the effects of massive destruction of the American economy on both the remaining facilities and supplies, and the changed requirements for them. If thermonuclear war should strike us, most of our energies for a considerable period of time would be devoted to saving lives and recuperating from the disaster. In planning against the problems of this kind of war, we need to develop not so much a mobilization base as a survival base.

This emphasis on saving lives is not dictated by purely humanitarian considerations although they must and should be a central consideration. Because of the growing ability of the Russians to deliver more and more weapons, and because ground bursts suck up tremendous quantities of dirt and deposit them over very wide areas as highly radioactive fallout, we cannot assume that any part of the United States would be safe from lethal doses of radiation in the event of a massive attack. And since people are susceptible to all three effects of the bomb—blast, thermal radiation, and nuclear radiation—while buildings and supplies are generally susceptible only to blast and thermal radiation, we can expect a greater amount of destruction to our human resources than to our physical resources.

ODM has been working on the concept of a survival base. A couple of months ago, ODM developed its first tentative list of survival items. It has been distributed widely within the Government as a general guide to mobilization readiness planning. This list is divided into 6 major categories: health supplies and equipment; food; body protection and household operation; light, power and fuels; sanitation and water supplies; and emergency housing and lodging. It will continue to undergo study and revision.

We are making a series of studies of supplies and requirements for these items after attack. We may find from these studies that the available supplies of some items after attack will be insufficient to meet requirements, or that they will be located in the wrong places. This presents important and difficult planning problems which we must face in the years ahead.

Now let me tell you about some of the other responses ODM is making to the problem of thermonuclear attack. I'd like to highlight four programs: continuity of government, regional mobilization coordination, damage assessment, and the testing of our preparations through Operations Alert.

In order to carry on as a nation after attack we must make sure that the Government survives as an operating entity. While the complete dispersal of the Federal Government from Washington would be impracticable, a sit-tight policy would be unthinkable. Accordingly, we have been working for several years on a program for the emergency relocation of essential functions in time of war.

Each agency, guided by ODM and the Budget Bureau, determines the rock-bottom functions that it would have to continue in the event of an attack. We then assign it a relocation area in a vast arc stretching to the west of Washington for a distance of 30 to 300 miles. In this area, it finds an existing facility—a hotel, college, or government installation—that could accommodate the number of workers needed to perform these rock-bottom functions. It stores at the site the essential records and current papers that would be required to operate there. It is tied into a secure, inter-agency communications system, using television, radio, teletype and telephone so that all the relocation sites can contact each other to carry on their business. In short, we have achieved a real operating capability in the event of attack. Forty-five agencies are involved, using 85 emergency relocation sites.

You may be asking yourselves what good all this will be if Washington is attacked without warning, and there is no opportunity for officials here to reach their relocation sites. That is a possibility. The answer to it is set up a line of succession and to delegate stand-by authority to a lot of places. In addition, at many of the sites there are now small cadres located permanently and able, if necessary, to assume command.

What I have been talking about involves officials only at the central government—headquarters level. We recognize that in the first days after attack these people may not play a very large role. The real job of survival will be a local, or at most a regional one. So we have been working to extend the continuity of government program to Federal field offices and, through the Federal Civil Defense Administration, to state and local governments.

We have recently established ten Regional Mobilization Committees. Each of these committees consists of about 20 Federal agencies with key mobilization roles. The committees have been giving first attention to establishing agency relocation sites in the field, and to-date there are about 225 of these. As the agency field officials are drawn into continuity of government actions, we are also beginning to train them in the substantive actions that they would have to take after an attack. As time goes on, we hope to spread this readiness planning and training in ever-widening circles until all local officials understand the national plans and know how to fit their own actions into them.

One of the problems of reasserting national direction of a survival effort after attack is the problem of obtaining quickly adequate information about the extent of destruction and the surviving resources. We have recently established a damage assessment center at a dispersed site outside Washington. This center is equipped with the latest and fastest electronic computer. We are feeding the machine, in advance, information about the location of all of the significant resources of the country—factories, population concentrations, power plants, bridges and tunnels, and so forth. Then, in the event of attack, we will be able to obtain rapid calculations of bomb damage by simply feeding the machine estimates on the location of ground zeros, the size of the bombs, and the height of their bursts. The computer will compare quickly the two sets of data and supply estimates of surviving resources.

This technique also enables us to assume attacks on many possible targets and to compute the over-all physical damage that can be expected. The damage assessment center is currently working on development of a survival probability index which will estimate the relative chance of survival of all our major resources, in every part of the country, under attacks of various magnitudes. This is a massive statistical job which would be virtually impossible without the electronic computer. A similar study is planned to determine fall-out probabilities in all parts of the country.

Finally, let me mention our annual Operation Alert, which is both a training exercise and a test of the plans and preparations we have made. These exercises, held each summer, are sponsored jointly by ODM and the Federal Civil Defense Administration. Operation Alert 1957 will be held in July. Its objectives are to appraise and improve our national readiness to take the actions necessary to win a war involving attack on U.S. forces and on the continental United States; to meet the survival and recovery needs of the Nation; and to maintain and strengthen the functioning of Government at local, state and national levels under emergency situations.

On July 12, there will be a hypothetical attack on the United States, and civil defense units at all levels will come into the exercise. The civil defense phase will last for three days and then the Federal agencies, manning their relocation sites in force, will spend five additional days working on problems of post-attack survival.

Exercises such as this test the capabilities of the relocation sites and the interagency communications system. They help us to find out if the actions we plan to take really make any sense at all. They bring many people in government into their only contact with mobilization planning. They also provide an excellent training ground for our growing civilian reserve of executives from industry who have agreed to make themselves available to the government in time of emergency.

The various programs which I have described to you are all designed to move us along toward an objective which we call mobilization readiness. Mobilization readiness is the counterpart of military strength—it is a comparable position of strength in the non-military field.

There are three major elements of our national security posture—all designed to deter attack upon us. The first of these is our military offensive forces—primarily our strategic air and naval power—which discourage aggression by standing as a warning that any attack on the United States would result in instant and massive retaliation. The second is our military defenses which discourage aggression by their ability to intercept an attack and thereby reduce its effectiveness. The third is our non-military defenses—mobilization readiness and civil defense—which discourage attack by limiting the destruction that can be inflicted by the bombs that get through, and by improving our ability to survive and go on to win the war.

These deterrents to attack must be developed in relation to each other. All three are essential. They are like the three legs of a stool.

This triad is not well understood by the general public, or even the informed public. Many people think that the Office of Defense Mobilization is some part of the Department of Defense. They assume that anything to do with defense planning is automatically a military responsibility.

Actually, the whole idea of civilian mobilization plan-

(Continued on page 19)

ADDRESS OF WELCOME TO A. F. C. A.

By

THE HONORABLE RICHARD E. HORNER

Acting Assistant Secretary of the Air Force
Research and Development

At the Opening of the 12th Annual Meeting of A.F.C.A., Sheraton-Park Hotel, Washington, D.C., on May 22, 1957

MR. Chairman, Members of AFCA and Guests:

May I say first of all that I am delighted at this opportunity to take part in the 12th Annual Convention of your splendid organization. On behalf of the United States Air Force which this year is privileged to be your host, and our sister services, I wish to convey a most cordial welcome to all of you. This gathering is an obvious indicator of the many rewarding aspects of the harmonious, cooperative relationship that exists between the military establishment and the chemical industry so ably represented in this assemblage and I think it might be pertinent to mention a few of the benefits that result from our mutual professional interest and the spirit of fellowship which stems from our joint efforts in seeking common objectives.

Of major importance is the fact that the teamwork we have achieved and practiced represents a fundamental advantage to the nation in the urgent program of maintaining a lead in military technology. As we all have good reason to know, that lead is a prime requisite of national security in this atomic-jet-missile age. It seems beyond question to me that in a climate of cooperation born of goodwill and respect, we can generate a measure of ingenuity that cannot be matched by a system of rigid state authority and control. In fact, that premise makes a compelling case for our decision to adopt a national strategy that places primary dependence on superior weapons as the product of a free people.

On this basis it is not surprising that the Defense establishment has decided as a matter of policy to support and to help sponsor the activities of your organization. I know you will forgive me if at least a portion of my comments stem largely from my Air Force background, but I want to make it absolutely clear that we recognize as a pre-requisite to our success in advancing vital defense programs, the vigorous and enlightened action of the chemical industries in prosecuting research in areas that correspond to our special requirements. I know that our sister services would join me in this assertion.

I would like to select a few brief remarks for this occasion bearing in mind the principal purpose of your organization; that is, the promotion of national defense through the timely and appropriate applications of chemical science. And I am profoundly impressed by the range of topics which appear on your agenda in support of that aim and also by their direct relationship to the areas of technical progress which claim our greatest interest in the Armed Forces.

You are indeed "setting the sights of industry" as your theme for this convention would indicate. This is good and I would like to advance some compelling reasons why the chemical industry, hand in hand with the Armed Forces, must continue to move forward as rapidly as possible toward higher plateaus of scientific achievement. The number one reason has to do with the intense Soviet program for expanding and improving its entire spectrum of industrial activity. In advancing that aim, the Soviet leaders are to a degree dependent for success on a prodigious program of expansion for their chemical industry. As a matter of fact, they are now the second largest producer of chemicals in the world, exceeded only by the United States. If one takes into account the chemical production of the Soviet Satellites, particularly that of East Germany, they have already achieved a formidable quantitative output closely rivalling our own. And actually, a quantitative comparison may be somewhat misleading since, as in other areas of the economy, a great portion of our chemical production is designed for use in peaceful pursuits, whereas the Soviets place greater emphasis on the strategic use of chemicals for heavy industry and direct military application.

The forced growth pattern set by the Soviet five year plan calls for a two-fold increase of chemical production levels over the time period from 1955 through 1960—a considerably higher rate than we expect to attain in the same interval. It might be assumed that their effort would be favored by the excellent raw material base that is available to support their mushrooming chemical industry. Furthermore, in order to accelerate the exploitation of these resources, the Soviet is conducting an extensive chemical research and development program, and in a move to overcome past deficiencies in skilled labor and modern production techniques, they are also training vast numbers of chemists and chemical technicians. Taken in the aggregate, an impressive capability for supporting the future growth of Soviet military technology by an adequate chemical industry is indicated. Indeed the competition in the chemical field is becoming tougher every day and this competition underscores the continuing need for teamwork between the Armed Forces and the chemical industry in our own nation.

Probably an outstanding example of the benefits that accrue to the close integration of Military Technology and industrial know-how, is the progress that has been made in materials development—a field in which the chemical industry has made, and I am sure will continue to make, major contributions. In our Air Force weapons development program, and in the materials problems associated

with it, we are emphasizing the requirements introduced by high speed, and high altitude flight. Specifically, these include requirements for materials that are functional in very severe environmental conditions. Extreme temperatures, nuclear radiations, corrosive products of combustions accoustic disturbances, erosive gas flows and punishing vibrations and stresses are but a few of the conditions dictating material development and selection.

Many of these requirements will be spelled out in considerable detail during your meeting. So, I have touched on them in my remarks only to the extent of indicating the direction in which we are moving.

Again, I wish to emphasize that consideration of our quantitative manpower resources and natural resources in relation to the Soviet, have prompted us to compete primarily on the basis of qualitative superiority in all the elements of our military power. The wisdom of this decision is demonstrably evident in the instruments of nuclear ordnance that are now operational. Our stockpile of nuclear weapons has increased—the devices are lighter, more powerful and more diversified. Our aircraft and our missiles that are coming into operation are vastly improved delivery systems over anything we had at the end of World War II.

Consequently, we are now able to deliver more firepower over greater distances with greater speed against a larger number of targets and with greater accuracy than ever before. In an absolute sense, our deterrent military power is greatly increased. However, the element of competition introduced by the rapid pace of recent Soviet gains forbids complacency.

We must therefore move ahead as rapidly as possible with the development and introduction of new and improved weapons into the military arsenal. Our success in this endeavor will depend in the future, as it has in the past, on the closest cooperation and teamwork between the military and industrial segments of our society. I am confident our joint study of mutual problems at this annual meeting will contribute immensely to that aim. Again, it has been a privilege to welcome you on this occasion. Please accept my most sincere wishes for a most pleasant and productive meeting.

DEFENSE MOBILIZATION

(Continued from page 17)

ning goes back only to 1947, when the Congress enacted the National Security Act. That Act not only established the Department of Defense; it also set up the National Security Resources Board to assure that the civilian part of our economy, as well as the military, would be considered in planning a future mobilization. That function was taken over by ODM in 1953. Accordingly, ODM, on the civilian side, plays a role somewhat like the Secretary of Defense and the Joint Chiefs of Staff on the military side. On behalf of the President, we establish policies and coordinate mobilization actions on production, procurement, stabilization, manpower, transportation and communications. To the greatest extent possible, we delegate the job of achieving mobilization readiness to the many agencies of government who have peacetime responsibilities in these fields. This gets the planning done by the people who would have to carry it out, and it helps to keep mobilization readiness from becoming an ivory tower operation.

I LOOK to you, as leaders of American industry with a primary concern for national defense, to help us obtain public understanding of the importance of this work. From that understanding will come the support necessary to achieve real mobilization readiness.

HARSHAW

Synthetic

OPTICAL CRYSTALS

• The rapid development and extensive application of instrumental analysis has been made possible to a large extent through the infrared and ultra-violet transmitting optics supplied by Harshaw Chemical Co. The development of the process for growing large size crystals and the production of these synthetic crystals commercially are among the Harshaw Laboratory's important contributions to science.

Rigid control of all steps in the manufacturing process assures a uniform product of lasting quality.

Sodium Chloride	Silver Chloride	Cesium Bromide
Potassium Bromide	Calcium Fluoride	Cesium Iodide
Potassium Chloride	Lithium Fluoride	Thallium Bromide Iodide
Potassium Iodide	Barium Fluoride	

Your Requests for Technical Assistance and Price Quotations are Welcomed

• Write for our free 32-page booklet "Harshaw Synthetic Optical Crystals"

THE HARSHAW CHEMICAL CO.

1945 East 97th Street, Cleveland 6, Ohio

INTRODUCTION OF AIR FORCE PROGRAM

By

LT. GENERAL THOMAS S. POWER

Commanding General Air Research & Development Command
United States Air Force

At 12th Annual Meeting of A.F.C.A., Sheraton-Park Hotel, Washington, D. C., on May 23, 1957

(General Power in his address emphasized the importance of chemistry in the Air Force development program and called for a return to the principle of industry-financed research work.)

THE theme of your 12th Annual Meeting—"Setting the Sights for Industry"—is particularly appropriate at this time. For never before in the history of science and technology has industry faced a challenge of the scope and magnitude as the one with which it is confronted today. It is, therefore, well to pause and study the road ahead of us in setting our sights.

While most other disciplines of science have utilized the building blocks provided by nature, chemistry has been creating its own—evolving radically new substances and materials or synthetizing and improving upon existing ones. In this manner, the chemist has opened the way for fantastic progress in every field of scientific and technological endeavor, from medicine to metallurgy, from fuels to plastics.

There is no need to stress the impact which the science of chemistry has had on our private lives, on our economy, on our entire civilization. But I would like to dwell for a moment on the role of the chemical industry in advancing military technology, particularly with respect to the weapon systems of the Air Force.

In the subsequent discussions you will hear of some of the problems which we face in maintaining qualitative superiority in the air and how you can contribute toward the solution of these problems. You will note that, with every problem you help us to solve, a host of new ones is created. Because as chemistry and allied sciences permit us to penetrate ever deeper into the unknown, further advances become increasingly more difficult to attain.

We have now entered an area of aeronautical progress which poses problems radically different and immeasurably more complex than any problems that have ever challenged human ingenuity. Until a few short years ago, progress in aviation entailed the practical application of known phenomena or of new phenomena under known conditions. Today, we expect to operate—and to operate effectively—under conditions far beyond anything known in the history of human progress.

Our experimental aircraft have already reached speeds at which the seemingly well established laws of aerodynamics no longer apply. Advanced aircraft of the not too distant future will be subjected to aerodynamic heating which none of the structural materials or methods known today can withstand. Never before experienced extremes in heat are matched by commensurate extremes in cold; the problems created by extremely high gravitational forces are compounded by those of extremely low air densities. All these extremes must be challenged again and again by the airplane—its structure, its powerplant, its components, and, if manned, its human operator—if progress is to continue.

As we reach higher and higher, we approach conditions close to those of space itself. With atmospheric pressures dropping to almost zero, we must begin to think of the effects of unimpeded solar and cosmic radiation, and even of the dangers posed by meteoric particles. The higher we go, the closer we come to the state of weightlessness the effects of which are practically unknown to us because we have never had to worry about them before.

But the realm of new phenomena created by new conditions is not limited to the extremes of altitude. A host of such conditions arose with the explosion of the first atomic bomb. Proven concepts of construction, design, and protection tumbled, together with long-established concepts of offense and defense. The reason therefor was not merely the awesome destructiveness of the explosive shock and heat, but the strange, invisible radiation which, for the first time, was loosed in vast quantities over vast areas. Until then, only a small number of scientists knew how to create and employ minute quantities of this radiation for therapeutic and other beneficial purposes. Now the knowledge gained in the fields of atomic and nuclear radiation, spurred by military requirements, has opened up a fantastic array of peaceful and commercial applications in the fields of medicine, chemistry, power generation, testing and control, to mention but a few.

However, the utilization of atomic energy and its by-products—whether for military or commercial purposes—is fraught with dangers and problems which, again, have no precedents. We still know relatively little about the effects of nuclear radiation on organic and inorganic materials, on the human body, on the operation of various types of apparatus and instruments. We still have a long way to go in the development of practical and effective means for shielding and over-all protection.

All of the new and baffling problems posed by pioneering in unprecedented environments and conditions affect the chemical sciences and industry in one way or another. Both aeronautics and chemistry cover the entire spectrum of science and technology—the former as a user, the latter as a contributor. For this reason, aeronautics depends on the help of chemistry more than on that of

most other disciplines in probing continuously deeper into the unknown.

Of course, the very nature of chemistry entails a constant struggle with the unknown in extending the limits of human knowledge. That is why research, no matter how demanding, is nothing new to the chemical industry. In fact, the amazing growth and dominant position of the chemical industry today are due entirely to its painstaking and aggressive research programs even at a time when most other industries had not yet gained full appreciation of the importance of research and development.

As a valued teammate of the Air Force's Air Research and Development Command, the chemical industry finds itself not only on the threshold of a new era in research. But it also has to perform that research under conditions which are equally unique.

THE average chemical scientist, like any other scientist, can best conduct his research in the academic atmosphere of the laboratory, an atmosphere conducive to thinking and creation—unhurried and motivated only by the curiosity of the scientist. However, the problems associated with research and development of advanced aerial weapon systems are so pressing and so urgent that TIME has become our most critical commodity.

Continued success in our struggle for survival as a free and prosperous nation is contingent on our ability to maintain our technological superiority. In this respect, we face a very formidable adversary who has not only the advantage of quantitative superiority in many areas and already qualitative superiority in some areas, but who is waging the sliderule war against us with rapidly increasing resources in scientific manpower and facilities. To maintain our still existing though dwindling lead, we must make every effort to reach continuously higher plateaus of technological advancement, and we can do so only through well-coordinated and time-phased advancements in every area affecting weapon system development.

Considering the vital role of chemistry in all of these areas, it is evident that chemical research for military needs can no longer seek its own pace but must be accelerated to the utmost in order to keep in step with the pace of research in all related areas. This, I know, is a difficult requirement to meet. The decisive point is—whose scientists can meet this requirement better: the Soviets' or ours?

Finally, there is the problem of the ever mounting costs of military research and development and their impact on our civilian economy. Since the end of World War II, when we began to realize that we had to engage in a race for technological supremacy with the Soviets, the increasing demands of military research and development, have required increasing participation of science and industry. This is exemplified by the present operation of ARDC as the R&D management tool of the Air Force, contracting over 80% of its research and development effort to universities, scientific institutions and industrial organizations.

The cost of this effort has risen in an exponential curve due to the rapidly increasing operational requirements and complexity of advanced weapon systems. While we are making every attempt to get more research and development at less cost and faster, through improvements in organization and management, we are approaching the point where we can no longer maintain the present pace of technological progress without seriously affecting our civilian economy.

FOR this reason, we are encouraging industry to return to the principle which has helped to make it the most advanced and prosperous in the world—the principle of financing its own research and development projects, even those considered to be of primary military interest. To assist industry in assuming a greater share of the air research and development burden, ARDC has initiated a broad program of furnishing interested and qualified industrial organizations pertinent technical information and of providing them guidance for channeling their R&D efforts into the most promising and profitable fields. This system should prove of particular benefit to the chemical industry because, more than most other industries, it has been able to gain much benefit from the commercial exploitation of products developed under military sponsorship.

A new era in research . . . the crises in time . . . the growing demands for more economy in military expenditures . . . all these pose unprecedented challenges to the chemical industry. If you will set your sights high enough to meet these challenges, I am confident that you and we together will successfully accomplish our common mission.

THUNDERBIRDS FLY FOR A.F.C.A.

A most welcome interlude in the professional discussion phase of the special program for A.F.C.A. members at Andrews Air Force Base on May 24, was a demonstration of flying skill during the midday break by the U.S. Air Force famous Precision-Flying Team, the "Thunderbirds." The breath-taking maneuvers and flying feats demonstrated by the "Thunderbirds" four-plane team, and soloist, provided a highly appreciated feature of the meeting.

These intrepid airmen, all veteran combat pilots, are: Major Robby Robinson, leader; Captain Doug Brenner, right wing; Captain John Bartley, left wing, and 1st Lieutenant Bill Pogue, slot. The soloist is Captain Sam Johnson.

Visitors felt that the Thunderbirds' announcer (name not learned) carried out his role in most befitting manner, and they also gave a "big hand" to the group of some 25 enlisted technicians who "Keep the Thunderbirds in the Air."

TECHNICAL PROGRAM PLANNING DOCUMENTS

By

COLONEL WILLIAM A. WILLIAMS, USAF

Chief, Programs Office, Assistant Deputy Commander for R&D (Program Control) ARDC

(Presentation made at the 12th Annual Meeting of A.F.C.A., Sheraton-Park Hotel, Washington, D.C., May 23, 1957)

I WELCOME this opportunity to talk to you about the Technical Program Planning Documents and the ARDC program for releasing these documents to responsible civilian organizations. I will attempt to point out the objective of the program, what we hope to accomplish by it, and the manner in which we are attempting to achieve the objective.

To state it formally, the objective of the Technical Program Planning Document release program is to engage the engineering and scientific talent of the United States under an Air Force-Science-Industry Team-concept for the purpose of providing a more comprehensive and integrated effort in achieving Air Force goals in research and development.

It is recognized that in order to win the race for world air supremacy, the Air Force must enlist the full support of the technical talent of the United States if we are to solve our problems in research and development before the enemy solves them for us. An Air Force-Science-Industry Team-concept is essential if we are to build and maintain a superior Air Force and thereby ensure our national security. Only by taking the people of science and industry into our confidence in time to assist in laying the basic groundwork for our research and devolpment can we utilize their valuable potential and establish the framework for technical breakthroughs which otherwise might not occur.

Just what does this actually mean to the R&D planners in your organizations? It means that no longer will it be necessary for them to operate in the dark in their efforts to predict future USAF goals in technical development. It will no longer be necessary to try to "out guess" the Air Force in order to establish long-range planning objectives normally aimed at (what you think *might* be) Air Force requirements. The resources expended by industry in determining what the Air Force wants, or on projects which, because of enforced ignorance, are not in furtherance of future performance goals, are pure waste. Neither we nor the country can any longer afford such luxury for obvious reasons. In the final analysis, national security is founded on the ability of the scientific and industrial resources of the nation to achieve the technical objectives which make possible the development of new and advanced weapons — and it is only common sense that everyone on the team should be kept fully informed of our goals as we see them.

Let's turn now to more specific aspects of the Technical Program Planning Document release program —TPPD's. I am sure that you are interested in examining, for a moment, the type of information being released. This document, the TPPD, is the ARDC tool for planning technical development under the technical program concept. This concept is a philosophy of R&D management. I am sure all of you at one time or another have heard of it. Briefly, there are three phases in the R&D program structure. One, the operational program which is aimed at the first generation of Air Force weapons—those becoming operational in the next five years. The products of this program are specific weapons, systems, components, and other materiel being developed to meet specific operational needs by specified dates.

Under the technical program the other two phases come to light: Technical Development and Research. Technical Development is aimed at the second generation of weapons— those which will be needed in the next ten to fifteen years. Research is aimed at the Great Beyond. The products of Technical Development are experimentally demonstrated techniques and capabilities which later may be development-engineered into specific items of materiel to meet operational needs. Technical Development covers that spectrum of R&D between *pure* research and the application of demonstrated technical capability to the weapons development. It is this aspect with which Technical Program Planning Documents are concerned and you also as participants in the release program.

At this point I would like to digress briefly to point out where, and on whom in the ARDC structure, these responsibilities for research and development fall.

At Headquarters ARDC the Deputy Commander for Research and Development, General Demler, is responsible for the technical program. The research and technical development programs are formulated in the various directorates under him.

Also at Headquarters ARDC the Deputy Commander for Weapons Systems, General Boyd, is responsible for utilizing the results of our research and development efforts. The Weapons Systems people are those who carry on after an effort has been brought to the end of technical development.

Now that we have *oriented* ourselves with regard to the instrument being released, the TPPD, let's focus our attention specifically *on* it. As I mentioned a moment ago, it is the Headquarters' tool for planning technical

(Continued on page 37)

PROPRIETARY RIGHTS

By PAUL SHERWOOD

Chief Patents Division
Office of the Staff Judge Advocate, Hq. ARDC
U.S. Air Force

(Mr. Sherwood here discusses new provisions of Armed Services Procurement Regulations (ASPR) respecting Government and contractors' rights in inventions.)

THE MATTER of protection of Proprietary Rights has taken on increased emphasis recently not only because of the patent program of the Department of Defense but also because of increased procurement by DOD of technical data, drawings and reports incorporating "trade secrets" and "know-how."

In the patent field the contract between the Government and the contractor sets up the obligations and rights of the Government and contractors in inventions which arise out of or are used in the work performed. There is a great deal of uncertainty here, because, at the time when the contract is entered into, you don't know what inventions may develop from the experimental or development work and neither the Government nor the contractor know when they may be sued for infringement of someone's patent. To a large extent the Government must depend on industry to perform its research and development work because there are insufficient facilities engaged in pure research work that can be hired. Companies not primarily engaged in the research and development business for hire do a lot of our development work because of patriotism, or, as a representative once said. "because they don't want to have to learn to speak Russian." Some companies take on Government R&D work because the particular field is one in which the company has a commercial interest. In any case, the company doing R&D work for the Government must consider its competitive position, the rights of an employee-inventor, and the question of damages, if there is liability in a suit for patent infringement.

Section IX of the ASPR deals with patents and related clauses which are required to be included in DOD contracts. The views of industry were considered in the writing of the clauses for the ASPR.

It appears that there were two main areas of dissatisfaction. These were *background patents* and the *question of inventions first actually reduced to practice*. In the matter of background patents, that is, patents of inventions which were developed and put into practice entirely at the contractor's expense, the regulations now provide that the Government will not ask for rights in background patents in the negotiation for a contract for R&D work. Where a second source of supply is essential, the Government can either purchase a license or encourage the second source of supply to do so in which case the royalty charges would be an allowable item of cost in the price of the second source contract.

With respect to rights in inventions which are conceived prior to the contract, when the invention covered by the patent application is first actually reduced to practice, as by making a model, in the performance of the contract, the standard ASPR patent clause would grant the Government a license thereunder. This requirement is based on the equitable principle that normally the cost of actual reduction to practice, as by making a working model exceeds the cost of conception and since the Government is paying a substantial portion of such costs, it is entitled to make, use or sell such an invention without being required to again pay for development in the form of royalty charges.

Here again, however, the ASPR provides means whereby specific inventions may be excluded from the scope of the patent rights granted to the Government. If the contractor can show that his expenditures in actually reducing an invention to practice exceed those paid for by the Government then such invention may be excluded. Or even if the cost of making a working model of an invention is borne by the Government, the invention may be excluded if the contractor can show that the invention was reduced to practice as by engineering design so that it would be clear to one skilled in the art that the invention does not need a working model to show that it operates for the intended purpose.

While there are problems arising out of the Government's patent policy, the greatest problems are the result of the requirement in Government contract that contractors furnish technical data, reports and drawings. In considering this problem, let us assume the hypothetical case of the John Doe Corporation who is under contract to supply generators to the Government under a contract which requires delivery of detailed drawings, manufacturing information and reports. The Doe Corporation normally supplies generators to the general public and has a substantial commercial market. In addition, the Doe Corporation has a good research and development department designed to enable it to retain its prominence in the generator field. The Government contract required the contractor to make certain design changes in the Company's basic generator design to adapt it to use for airplanes. The generator proved to be so superior that the Government decided to scrap all other designs and procure only Doe Corporation generators.

In view of the R&D work required, the Government

(Continued on page 35)

* This presentation was made by Mr. Sherwood at the morning session on May 23, 1957 of the 12th Annual Meeting of A.F.C.A. at the Sheraton-Park Hotel, Washington, D.C.

A. F. C. A. SCIENCE TEACHER $1,000 AWARD

Mr. Jacob M. Skilken, Cincinnati, O., Chemistry Teacher, Selected as Outstanding Among Candidates Named by Chapters. Presentation made at 12th Annual Meeting.

MR. JACOB M. SKILKEN, teacher of chemistry at the Walnut Hills High School, Cincinnati, O., was selected by the A.F.C.A. to receive its $1000 Science Teacher award this year as an outstanding teacher of science at the high school level.

The selection was made by the Association's Committee on Awards from among recommendations with supporting evidence submitted by participating chapters naming candidates selected by the chapters from teachers in their respective areas. The award consisting of a check for $1000 and a commendatory scroll was presented to Mr. Skilken at the annual banquet for the 12th Annual Meeting on May 23 at the Sheraton-Park Hotel, Washington, D.C. Mr. Skilken was one of the guests of honor of the Association. The presentation was made by Mr. Glenn A. Hutt, A.F.C.A. President.

As prescribed by the Awards Committee, chapter nominations were limited to a full-time teacher of science or mathematics in a public, private or parochial high school in the chapter area, or to a full-time supervisor of science or mathematics for a group of schools, who has been a full-time science or mathematics teacher. The schools were limited to those in the Continental United States.

In the case of the candidate selected for the award, the committee found that the evidence clearly supported the views of the Chapter that his teaching was most inspiring and aroused a zeal for learning, and a deep appreciation of science even among students who have not followed science as a career.

Among Mr. Skilken's achievements, as noted by the Cincinnati Chapter, was the development on his own initiative of an All Honors Program in Chemistry for high school seniors, which is understood to have been accepted by many colleges as the equivalent of the college freshman course in chemistry.

A press release about the award issued by the Association at the Annual Meeting in Washington, D.C., stated in part as follows:

"Evidence encountered revealed that Mr. Skilken had the ability to influence youngsters to pursue all kinds of scientific inquiry. His habit of wide-reading on educational and philosophic subjects broadened his views and lead him to study the necessities of a technological society, and to influence youngsters in ways a great deal more fundamental than simply the appeal of a technical career as a means of earning bread and butter. His students appreciated the deep insight in the world of values they have received through Mr. Skilken's classes."

Mr. Skilken is married and has two children. He received his Bachelor's Degree at the University of Cincinnati and, in the course of subsequent years, has done graduate work at the University of Cincinnati and also at Harvard and Cornell as a Shell Oil Company Fellow.

The A.F.C.A. science teacher award was established by the Board of Directors last year in furtherance of the program which the Association had carried on for some years in promoting the development of technical manpower. The first recipient of the award, which was presented at the banquet of the Association's Annual Meeting in Boston on June 15 1956, was Mr. Howard B. Owens, biology teacher at Northwestern High School, Hyattsville, Md. Mr. Owens was the selectee of the Baltimore Chapter of the Association.

Mr. Skilken (standing left) receiving A.F.C.A. science teacher award from President Glenn A. Hutt at annual banquet of 12th Annual Meeting, at Sheraton-Park Hotel, Washington, D.C., May 23, 1957

U.S. Air Force Photo

OPENING REMARKS

By

MAJOR GENERAL JOHN P. DALEY, U.S.A.
Director of Special Weapons
Office of the Chief of Research & Development
Hqrs. U.S. Army, Washington, D.C.

Introducing U.S. Army part of the program at the 12th Annual Meeting of the Armed Forces Chemical Association, at Sheraton-Park Hotel, Washington, D. C., on May 23, 1957.

(General Daley, noting the essentially chemical nature of all forms of warfare, stressed the vital dependence of the Army on the work of the American Chemical Industry.)

MR. PRESIDENT, LADIES AND GENTLEMEN:

I notice that the theme of this conference is "Setting the Sights for Industry." Those of you who have sprawled out on a rifle range know that in setting the sights you have got a gadget that will set the range and another gadget which will correct for lateral deviation in the bullet's trajectory. The so-called windage screw. When I contemplate the number of talks which you have already heard and the number of talks which you face in the next two days, I hope that nobody paraphrases the slogan, "Setting the Sights for Industry," into another expression—"Giving Industry a Little Windage."

I have the peculiar task of introducing the Army presentations, when as a matter of fact, a great many of the Army presentations have already taken place. I refer, of course, to the fine presentations already made by the Army Chemical Corps. This afternoon and tomorrow afternoon the Army is presenting certain facets of our research and development program which are not within cognizance of the Army Chemical Corps.

The Armed Forces Chemical Association in its charter directs its attention to the problems confronting the military services, "particularly, but not exclusively, related to chemical warfare." The Army presentations of today and tomorrow fall in that portion of your interest "not exclusively in fields related to chemical warfare."

Your charter, along with all our military literature, implies that there are two kinds of warfare—chemical warfare and what, for lack of a better term, I call non-chemical warfare. Taken literally, there is no such thing as non-chemical warfare—it disappeared in the dim, dark ages when a cave man first used fire to harden the stick on which he intended to impale his neighbor.

What we have today is chemical warfare and also warfare which is largely chemical. What I hope you will realize from the Army presentations, is that while this assocation has a great and direct interest in chemical warfare and the work of the Army Chemical Corps, you should have an equally great interest in the rest of the Army's research and development program. The Army moves, fights and communicates as a result of the work of American Chemical Industry.

The Army research and development program in the materiel field has three primary objectives—more flexible firepower, greater mobility and more perfect communications.

In the field of firepower the Army wants extended ranges in its weapons in order to meet the needs of the dispersed battlefield of the future. We seek those extended ranges in the missile and rocket field. In that field we find the ways to make weapons more mobile and the amount of firepower adjustable to the situation. We want not always a big bang; not always a little bang; but the right amount of firepower at the right time and at the right place. Much of our progress in this field goes directly back to the chemistry of propellants and much of our future progress will depend on the progress made in American Chemical Industry. We need more powerful propellants, so to speak—more "push per pound." We need propellants that are more reliable and we need propellants that it doesn't take a Ph.D. to handle.

Turning to mobility, our objectives are rather simple. We want lighter equipment which we can move in aircraft and helicopters and we want our vehicles, air or ground, to go farther on a pound of fuel. We are beginning to reap the benefits of the lighter and stronger metals made possible by the chemistry of the past two decades. A good deal of our progress in the future will be measured by the future progress of the Chemical Industry.

As for communications, you yourselves know better than I how much our progress in smaller, lighter, better communications equipment has depended on progress in the no man's land between chemistry and physics. We in the Army are cognizant of the fact that our future communications progress is bound to a great extent to the future of industrial chemistry.

The civilian members of your association have done a wonderful job in supporting the work of the Army Chemical Corps. We in the Army are glad of that. Many corporations and educational institutions represented here have active contracts in chemical and related fields with other Technical Services of the Army. I hope that these will continue and expand. In a much larger sense than ever before in our history, the Army's responsibility is a responsibility which you must share. The Army's goal is a hard-hitting, more mobile, missile age Army. Make it your goal, too!

At this time I would like to introduce Colonel John Ord, Chief of the Research Division in the Office of the Chief of Research and Development who will talk to you on the Army research program.*

* Colonel Ord's address, illustrated extensively with slides, emphasized the importance of the research and development functions of the Army as indicated by the establishment of The Office of Chief of Research & Development at the rank of Deputy Chief of Staff in the new organization of the Army Department.

THE FORWARD LOOK IN THE ARMY CHEMICAL CORPS

Address By

MAJ. GEN. WILLIAM M. CREASY
Army Chief Chemical Officer

Before 12th Annual Meeting of Armed Forces Chemical Association, May 22, 1957 Sheraton-Park Hotel, Washington, D. C.

"A NATION DENIED its rights may use any weapon, even bacterial warfare. The new poison gases are horrible, but there is no difference between a slow death in barbed-wire entanglements and the agonized death of a gassed man or one poisoned by bacteria. In the future, whole nations will stand against each other, not merely hostile armies. We shall undermine the physical health of our enemies as we shall break down their moral resistance."

These were the words of Adolph Hitler in 1932 when he was even then spinning the web in which he finally became entrapped.

More recently, just about a year ago, Soviet Defense Minister Georgi Zhukov made a speech before the Communist Party Congress in Moscow, in which he said that airpower and nuclear weapons alone would not win any future war. Then he added this warning—"any new war will be characterized by mass use of airpower, various types of rocket, atomic, thermo-nuclear, chemical and biological weapons."

The Soviets have revived germ warfare propaganda with a warning by the Soviet press of the possibility of "dangerous travelers" from the West, in the form of plant pests being slipped into the country.

Concerning this, a *New York Times* editorial on April 9, stated that it is easy to laugh off the latest blast in the Soviet Union about "germ war" being conducted by the United States. "What we must remember," the editorial stated, "is that this bit of fantasy is not designed primarily for Russians. It is a part of a propaganda campaign against the United States that is expected to have its ultimate impact among the uninformed or the unsuspecting everywhere in the world." The editorial ended with these words: "The United States should move swiftly and strongly to brand this lie for what it is."

To oblige the *New York Times*, with which I am in full agreement, I hereby state that if we were engaging in undeclared biological warfare with the Soviet Union we would not be so stupid as to believe that a few insects hidden in flower pots could do any real damage. You will recall the germ warfare propaganda during the Korean episode, equally as silly, but some people did believe it.

Unfortunately, this country has not refuted these lies forcefully enough to dispel in the minds of people everywhere any beliefs they might have that the United States is even remotely guilty of such charges.

Looking for the motive in these accusations, should we not consider the fact that such propaganda possibly is being employed to build up a justification for the use of this form of warfare by our accusers should the occasion arise?

In all of our preparations for national defense we must be ready for any possibility. As we approach an equality in particular weapons systems among nations, and a balance in offensive and defensive capability, the search then must begin for systems in which such equality has not been reached. No possible form of warfare should be neglected, as an enemy can be expected to take full advantage of any chinks in his opponent's armor.

We must remember the word of Hitler in 1932 when he said that a nation denied its rights may use any weapon. I do not believe that the mental workings of dictators has changed much since 1932. A nation bent upon aggression manufactures its own definition of its rights.

For these reasons I am firmly of the belief that weapons systems in the particular province of the Army Chemical Corps must be developed on a par with those of other systems. We can never trust to luck that because these weapons have not been used in recent wars an enemy will not use them.

The U. S. Army Chemical Corps must look forward, not backward. We cannot be safe in assuming that what has happened, or what has not happened, in the case of the toxicological weapons, can be a prologue to the future.

I had this in mind when I assumed command of the Corps. I had some very definite ideas about strengthening the ability of the Corps to carry out its mission in a forward looking manner. I felt that one of the first steps was a revamping of the organization and structure of the Corps. I appointed a committee composed of the best minds that I could find to look into the Corps' organization and operations.

A reorganization based on the report of this Committee was put into effect more than a year ago. We now have had time to look at this revision in the Corps' structure in the perspective necessary to appraise its effectiveness. I feel that the changes that were made on the advice of the advisory committee headed by Mr. Otto Miller have resulted in material improvements in the Corps' ability to carry out its mission.

In another area, I felt strongly that the Corps could do more to give our military and civilian key people within the Department of Defense a better understand-

ing of the weapons systems with which the Army Chemical Corps is concerned, and their places in national defense thinking and planning.

As a move in this direction, we have recently organized a CBR orientation team which has given presentations at a number of strategic places in the Department of Defense, and will give more. These have been highly successful and I have been gratified at the indications of interest in the Corps' missions and operations and the number of requests we are receiving for the presentation.

Going a step further, I felt that we should have an orientation course similar to those conducted by other branches of the Army. I have recently proposed that the Corps establish a one-week course at Dugway Proving Ground, during which senior military and civilian personnel would be given a concentrated orientation in toxicological warfare. This course will go into operation as soon as final approval has been received.

We have made substantial gains on many fronts in our efforts to give the Army Chemical Corps a forward look, but there are many more things to be done. Much of this depends upon the type of people that we have in the Corps, both civilian and military.

I need not take time to tell you how hard it is to recruit qualified people in today's competitive market. All I can do is to verify your own experiences. Like other organizations we struggle to make small net gains in scientific manpower. In some months our best recruitment efforts add up to only an "even break" with normal turnover. Nevertheless we have made some gains.

Today the proportion of professional and scientific people to total employees is 14 percent. In 1952 it was only 8 percent. We have four technical people now for every three on the rolls five years ago, but we need more, depending, of course, upon the amount of money available. As you know, we are now faced with the necessity of curtailing expenditures and it may not be possible to employ all the personnel we need, even if it were possible to get them.

This makes it even more important that we take every step possible to make the best use of available manpower resources. We also recognize that we must create incentives which will encourage professional and scientific personnel to stay with us.

We are going at the personnel problem in several ways. These include the use of more effective recruitment techniques; summer employment of professional personnel; full utilization of the talents of enlisted men with scientific and professional experience; utilization of the cooperative education program to attract young engineers and scientists.

Substantial progress has been made in our summer employment program for university professors, high school science teachers, and science and engineering students. We are now preparing for our third year in this program. Last year we had some seventy teachers and students on the rolls. We are definitely widening our areas of recruitment for full-time duty by this means.

Cooperative training, first undertaken at Dugway Proving Ground in 1955 with Utah State Agricultural College as the cooperating educational institution, is assisting employees to acquire skills that permit promotion in grade. The program of instruction covers five years with students alternately spending six months at college and six months on the job. A similar program is about ready to start at Fort Detrick in cooperation with Drexel Institute and Virginia Polytechnic Institute.

For the future we plan to concentrate upon career development of both active Army and Reserve personnel as well as civilian employees. We are also placing greater stress on the application of sound scientific management principles and procedures.

There is no simple definition of scientific management but it is recognized now both in industry and government the planned development of management personnel is necessary in order to stay in business. In the past ten years hundreds of industrial concerns have embarked on programs to improve the abilities of managers and executives. Such programs are even more vital in the military services, where the quality of operations may affect our ability to stay alive. The Corps has laid strong emphasis on management and is taking advantage of new techniques and procedures in this field.

While I cannot go into detail on our progress in the research and development field, I can assure you that substantial progress has been made under the leadership of Per Frolich and Jack Rothschild. We are vigorously pursuing new clues to better and new agents, and improved protective and defense techniques.

We need your help in this area particularly. You will hear from Dr. Metcalf, of the Army Chemical Warfare Laboratories, later on in the program about what is being done to enlist the aid of industry in furthering the search for chemical compounds and information which may have applications in our research work. We have received splendid cooperation from industry in this project, and we hope to extend the program much further.

The relationship between research and development, and engineering is a delicate one and has created problems both in industry and Government. Under usual procedures—and this is not a condition peculiar to the Army Chemical Corps—the flow of an item from research and development through engineering to final production is seldom smooth.

The Chemical Corps has established a system whereby representatives from the Engineering Command work as associate project engineers in the research laboratories during the early stage of the development of the item. When the item is ready for the engineering stage, the associate project engineer goes back to the engineering organization and takes over as project engineer. The same system is used in procurement. This makes it possible to inject the necessary engineering and mass production concepts at an early stage of an item's development.

In the short period that this system has been in effect, we have seen ample evidence that it saves time, manpower, and dollars.

I have avoided going into too much detail in this resume of what the Army Chemical Corps has been doing, but inasmuch as you have a closer concern with what we are doing than most audiences, I felt that they would be of interest to you. Of most importance, I have tried to show that the Chemical Corps is going forward and that we do not subscribe to any beliefs that chemical and biological warfare systems are outmoded and obsolete because of developments in the atomic field. A weapons system or an item of equipment becomes obsolete when it is no longer effective or competitive. The effectiveness of the chemical-biological weapons system cannot be determined on that basis since they have not been used in modern warfare.

There is always the possibility that an aggressor bent on total annihilation of a nation standing in his way would think as Hitler did when he said in 1932: "We

(Continued on page 39)

BUREAU OF YARDS AND DOCKS PROBLEMS IN PRESERVING MATERIALS AND EQUIPMENT

By

CDR. ARTHUR B. CHILTON, CEC, USN

Research Division, Bureau of Yards and Docks

(In this paper presented at the 12th Annual Meeting of A.F.C.A. at the Sheraton-Park Hotel, Washington, D. C., May 22, 1957, Commander Chilton spells out numerous challenging problems for the Chemical Industry. Ed.)

LADIES AND GENTLEMEN: In the few minutes I have allotted to me, I will try to present a few of the problems that are facing the Bureau of Yards and Docks which are of interest to the Chemical Industry, and the solution for which will probably result from improvements in chemical technology. In presenting these problems and asking for your advice and assistance, there are a few introductory comments of a general nature that I feel desirable to give.

In the first place, we in the Bureau of Yards and Docks cannot be sure that solutions do not already exist for many of the problems we have and which I shall mention to you. Technology is advancing these days very rapidly, and a tremendous amount of technical information is being made available in various publications and in various forms which the Bureau simply can not keep up with. The Bureau of Yards and Docks is primarily devoted to matters of construction, maintenance, and operation of public works and public utilities for the Naval Shore Establishment; and many of the more esoteric types of information in the fields of chemical technology are not adequately covered by the few chemists and chemical engineers that we have, simply because the whole field is too big. If some of the problems I give you already have solutions in your opinion, we would be very happy to be so advised.

Knowledge of Fundamental Properties

The next difficulty I am going to mention is one which is necessarily imposed upon us and which provides sometimes a barrier that it behooves all of us, both on your side of the fence and on our side of the fence, to surmount. As you know, in our purchase of materials, equipment, and supplies, the Armed Services are strictly bound by the Armed Services Procurement Regulations and by the Government and Military Specifications. These regulations are such that we have to follow a prescribed procedure in obtaining all material; and all technical and operational characteristics required of the material have to be put in the form of a specification which will be fair to all segments of industry, without bias. We are searching, therefore, not only for commercial products which will satisfy our requirements but also for the knowledge of the fundamental properties of these products which lead to the satisfaction of said requirements, so that these fundamental properties and the methods of testing for same may be prescribed in the standard specifications. This is sometimes rather difficult to accomplish, particularly in view of the very natural reluctance on the part of many industries to give up what they consider "trade secrets" in connection with their products.

Where to Obtain or Give Information

One final word before I start the main portion of this talk. If any of you gentlemen, or other representatives of your companies, believe that you have possible solutions to our problems, we would be very happy if you would come to the Bureau of Yards and Docks and present us your ideas. In general, you might make initial contact with the Director of the Research Division if it is a matter concerning new improvements, or with the Head of the Specifications Branch of the Engineering Division if it is purely a matter concerning the scope or wording of existing military and Federal specifications. If you come to the Bureau proposing a new solution or a new product to solve one of our problems, it is strongly urged that you bring with you all technical information that you have and can supply on it. In particular, it is desired that all tests and all preliminary experimental information that you may have obtained for this product be provided so that we will be in a position to judge best whether it meets our requirements or has the potential of meeting them.

The problems that I have to present may fall into four general areas. One is the area of *paints, preservatives, and other coatings.* The next is the area of *lubricants;* the third is the area of *materials;* and the fourth area concerns *miscellaneous matters.* I am going to indicate at once that for all the problems that I will present, what we are looking for are economical solutions even though I shall not always emphasize the economic aspects when presenting the specific problems. Most of these problems, we realize, are capable of solution immediately, if money is no object; however, I can assure you that in almost every problem of interest to the Bureau of Yards and Docks, the economic factor is most vital.

Paints, Preservatives and Coatings

The first problem area concerns *paints, preservatives, and coatings.* We have a need for paints and other coatings with fire retardant properties, which still have the other properties of a good paint or coating, such as, good adhesion, durability, good protective qualities, long life, etc. One type of paint or coating which we are particularly interested in is one which will withstand the burning of a thermite bomb, which may provide a

(Continued on page 33)

OUTSTANDING R. O. T. C. CADETS WHO RECEIVED A. F. C. A. AWARDS

This is the tenth consecutive year in which A.F.C.A. has made awards to outstanding R.O.T.C. cadets at certain selected colleges and universities, who are majoring or who did major in chemistry, chemical engineering or allied sciences.

The awards, applicable to juniors and seniors enrolled in Army, Navy or Air Force programs, are determined on the basis of academic and military training records and extracurricular activities. The award is a bronze medal with blue and yellow ribbon, together with engraved certificate suitable for framing. The program is in furtherance of the Association's traditional policy to promote the development of technical manpower in the interests of National Defense. Brief biographies of this year's winners in alphabetical order follow.

ANTHONY IGNATIUS ANTONIO, JR.

ANTHONY IGNATIUS ANTONIO, JR., a Regular Navy ROTC student at Columbia College, Columbia University, received his B.A. degree this year (1957) and next year will receive his B.S. degree in chemical engineering from the school of Engineering. He has maintained a high scholastic record. His campus activities include membership in Beta Theta Pi fraternity and active participation on the Varsity Wrestling Team. He is Chief Petty Officer of Company A. Cadet Antonio was born on 4 June 1935 in Atlas, Pennsylvania. His home address is 417 Wilson Street, Williamsport, Pa.

JAMES BENENSON, JR.

JAMES BENENSON, JR., chemical engineering, class of 1958 at Massachusetts Institute of Technology, received credit at MIT for the first two years of ROTC as a graduate of Georgia Military Academy, where his military honors included: Appointment as Regimental Commander (Colonel); Best Cadet Officer; Best Drill Cadet, and Commander Crack Drill Platoon. Cadet Benenson, whose home is inAtlanta Ga., is enrolled in the Chemical Corps ROTC unit at MIT and holds the rank of 2nd Lieutenant. In addition to high scholastic standing, his record shows participation in lacrosse and soccer, and the following campus activities: Member Sigma Nu fraternity; Executive Committee of the Institute; Class of '58 Representative on Institute Committee; Beaver Key Society, Ring Committee; Christmas Convocation Committee; T-Club (letterman's club); vice-president of Freshman Council.

JOSEPH EMERSON BROWN

JOSEPH EMERSON BROWN, enrolled in the ROTC Unit at Georgia Institute of Technology, has just completed his Junior year and is majoring in Chemistry. He has maintained a high scholastic average in both military and overall academic activities. He was awarded the ANAK Medal, May 1955, and American Legion Medal, May 1956. He holds the ROTC cadet rank of Captain and is presently assigned Company Commander of Pershing Rifles Company. His extra-curricular activities include President of Scabbard and Blade, membership in Armed Forces Chemical Association, Alpha Tau Omega, Tau Beta Pi; Intra Fraternity Council, Phi Eta Sigma, and Pershing Rifles. Cadet Brown, an outstanding student, is the son of Colonel Harry E. Brown, of Raleigh, N. C. He was graduated from Henry Grady High School in Atlanta, Ga., in 1954, having there been selected as the ROTC Cadet Colonel for the Atlanta City Schools. He was born in Minneapolis, Minn.; his permanent mailing address is 1112 Daniels Street, Raleigh, N.C.

ROBERT R. BUNTIN

ROBERT R. BUNTIN received his degree in chemical engineering at Vanderbilt University in this year's (1957) graduating class. He was enrolled in the ROTC program and attained the rank of Cadet Lieutenant Colonel. On the completion of his military course, 2 August 1957, he will be commissioned a Second Lieutenant in the U. S. Army Reserve. His academic achievements were outstanding in both the Basic and Advanced ROTC courses, and his class standing was 1 of 117. His campus activities included: Vice President Sigma Chi fraternity; President, Honor Council; President, University Club; Vice President, Scabbard and Blade; Vice President, Omicron Delta Kappa; member of Tau Beta Pi, and Co-Captain of the University Track Team. He has been nominated for Founders Medal, School of Engineering. He was born on 7 December 1935 in Nesbitt, Miss., and his mailing address is 4505 Harrison Avenue, Gulfport, Miss.

JAMES PAUL COSTA

JAMES PAUL COSTA, now a senior at Agricultural & Mechanical College of Texas, is majoring in Petroleum and Geological Engineering. He is a Master Sergeant of the Army ROTC Unit and has a background of most noteworthy accomplishments, which include: Outstanding freshman in the Corps in 1955; Outstanding sophomore in the Corps, 1956, and Distinguished Student for 4 semesters.

His college activities include: Two-year letterman, Varsity Rifle Team; Student Senator; Treasurer of Junior Class; Ross Volunteers; Phi Eta Sigma; and Freshman Drill Team. Cadet Costa was born on 22 July 1936 at Fort Worth, Texas. His mailing address is 1128 Bonnie Brae, Fort Worth, Texas.

WILLIAM RICHARD FOSTER, SR.

WILLIAM RICHARD FOSTER, SR., in this year's graduating class at Idaho State College, specialized in Zoology. He was a member of the ROTC Unit and attained the cadet rank of Major. He maintained an excellent academic record and was tendered a Regular Army commission which he planned to accept upon receipt of his baccalaureate degree. He was president of Science Club and member of Scabbard and Blade. He was born on 20 October 1935, in Pocatello, Idaho.

JAMES HART HIGMAN

JAMES HART HIGMAN, ROTC Cadet Colonel and Regimental Commander in this year's graduating class at University of Colorado, Boulder, Colorado, majored in chemical engineering. He was in the upper 5% national rating of 1957 U. S. Army ROTC graduates; was selected for Regular Army appointment as a Distinguished Military Graduate and held cadet rank Number 1 of 332. Cadet Higman was the recipient of the 4-year Regent's and the 2-year Cities Service Oil Company Scholarships. His campus activities included Vice President of American Institute of Chemical Engineers; Editor-in chief, Colorado Engineer, and a member of American Military Engineers. He held honorary offices in Tau Beta Pi, Phi Lambda Upsilon, Phi Epsilon Phi, Knights of Saint Pat, and was Vice President of Acacia fraternity. He was born in Cortez, Colorado, on 22 June 1935. His present address is Box 514, Cortez, Colorado.

JAMES A. JORDAN, JR.

JAMES A. JORDAN, JR., ROTC cadet, is a Junior in the College of Arts and Sciences at the Ohio State University, and is majoring in Physics. He has maintained an excellent scholastic record and was the recipient of The Academy and Canterbury Student Fellowship. He is a member of Pershing Rifles, Regimental Staff; Military Council, Pi Tau Pi Sigma (Signal Professional fraternity); and, OSU Military and Amateur Radio Club. He was born in Berkeley, California, on 28 December 1936.

LYNWOOD JAMES KRISCHKE

LYNWOOD JAMES KRISCHKE, born 14 November 1935 in Schulenberg, Texas, is a Major (Battalion Operations Officer, S-3) in the ROTC unit at Rice Institute, Houston, Texas. He is majoring in chemical engineering. He was the recipient of the Blanche White Scholarship 1955-56 and the Catherine Withers Roper and Benjamin E. Roper Scholarship 1956-57. He has been on the Dean's list of Superior Students at Rice for six out of seven semesters, and assisted in organization of new student Post of the Society American Military Engineers at Rice Institute. His campus activities include: Vice President 1957-58 Tau Beta Phi; President 1957 Society of American Military Engineers; Secretary 1956-57 Phi Lambda Upsilon; and membership in Sigma Tau, Chevron, and Rice Engineering Society.

ROGER NAYLAND KUST

ROGER NAYLAND KUST, 1957 graduate in the Chemistry curriculum of the school of Science, Education and Humanities, of Purdue University, was commissioned an Ensign in the Navy in June and ordered to active duty. As Midshipman of the Naval ROTC unit at Purdue, he held the position of Platoon Leader. Mr. Kust, born in Berwyn, Illinois, on 20 April 1935, was the recipient of a National Science Foundation Pre-doctoral Fellowship. His paper, "Theories of Metal-ammonia Systems," won the Student Award from both the Indiana and Chicago sections of the American Chemical Society. He was a member of NROTC Rifle Team; University Choir; Sgt.-at-Arms of Mock Political Convention; Phi Eta Sigma, national freshman honorary; Delta Rho Kappa, national science honorary; Phi Lambda Upsilon, national chemistry society; the American Chemical Society, Student Affiliates; and the Quarterdeck Society, NROTC students honorary. His present mailing address is 437 South Illinois Avenue, Villa Park, Illinois.

RONALD B. LANTZ

RONALD B. LANTZ, ROTC cadet specializing in chemical engineering, has completed his Junior year at the University of Nebraska. An honor-roll student for three years, Cadet Lantz has worked part time during the school year and each summer to help put himself through college. He enrolled in the University on the Regent's Scholarship in 1953 and is continued on it to the present date. He holds an assistantship in the Department of Chemistry which includes teaching a quiz section and a laboratory section. He was a member of the Championship Intramural basketball team for three years and is a member of the American Institute of Chemical Engineers. He was born on 26 May 1936 at Burchard, Nebraska. His home address is 3330 J Street, Lincoln, Nebraska.

HENRY FREDERICK LINDNER, JR.

HENRY FREDERICK LINDNER, JR., who has just completed his sophomore year in chemical engineering at Rensselaer Polytechnic Institute, Troy, New York, holds the rank of Cadet Lieutenant Colonel, Battalion Commander, the senior position in the Army Cadet Corps of the ROTC. He is the recipient of the Pittsburgh Alumni Scholarship for Full Tuition for four years. He also received the "Outstanding Sophomore ROTC Cadet Award." He is listed in Who's Who in American Colleges and Universities and his college activities include: President, Freshman Fellowship; Treasurer and President, respectively (Freshman-Sophomore years) Alpha Chi Rho Fraternity; President, Fouragere Military Honor Society; membership in Society of American Military Engineers; American Institute of Chemical Engineers; Tau Beta Pi; Pi Lambda Upsilon: He was born in Pittsburgn on 3 August 1935. His mailing address is 2940 Brevard Avenue, Pittsburgh 27, Penna.

WILLIAM ROBERT MOSER

WILLIAM ROBERT MOSER, ROTC Cadet Lieutenant Colonel, in this year's (1957) graduating class at Saint Peter's College, Jersey City, N. J., enrolled in the Pre-Dental course, was tendered and planned to accept a Regular Army Commission in the branch of his choice, Armor. Cadet Moser distinguished himself as a military student and was listed for designation as a Distinguished Military Graduate. His college activities included membership in Scabbard and Blade, Argus Eyes (Dramatic Society), and Mendell Society (Biology Club). Mr. Moser was born in Jersey City, on 29 September 1935. His home address is 28 Roosevelt Avenue, Jersey City, N. J.

PHILIP A. OSTRAND

PHILIP A. OSTRAND, ROTC cadet, in the Ordnance Branch unit, enrolled in Liberal Arts and Sciences, at the University of Illinois, is majoring in chemistry and has maintained an academic average in the upper 5% of his class. He is attending the University on a County Scholarship, a competitive achievement, which attests high scholastic standing. Cadet Ostrand has held the cadet position of First Sergeant, which is the highest rank a Junior may attain. He is a member of the Phi Eta Sigma Honorary Fraternity, the Chemical Honorary and Junior Association of the American Chemical Society fraternity on campus. He was born on 2 November 1936, in Chicago. His home address is 3848 Loyola Avenue, Lincolnwood, Illinois.

JAMES WILFRED ROSBOROUGH

JAMES WILFRED ROSBOROUGH, ROTC cadet with rank of Captain, enrolled in the School of Chemical and Metallurgical Engineering at Cornell University, Ithaca, New York, was born at Lago Colony, Aruba, Netherlands West Indies, on 2 December 1935. Cadet Rosborough has been designated a Distinguished Military Student. His extra-curricular college activities have included: Varsity 150# Crew, Coxswain; Alumni Secretary, Phi Delta Theta fraternity; and "Pros Ops," Chemical Engineering Honorary.

CLAUDE E. SCHINDLER, JR.

CLAUDE E. SCHINDLER, JR., AFROTC cadet Captain at University of Cincinnati, is a chemical engineering student. He was the recipient of the Col. Deeds Scholarship (National Cash Register Co.). Cadet Schindler's college activities include Scholarship Chairman, Sigma Alpha Epsilon Fraternity, and membership in Cincinnatus Society, Arnold Air Society, YMCA, American Institute of Chemical Engineers, and University Glee Club. He also was Freshman Advisor in the Men's Advisory System. He was born on 7 February 1935 at Dayton, Ohio. He resides at 2606 Hillview, Dayton, Ohio.

TERRY EARL SHARP

TERRY EARL SHARP, in this year's (1957) graduating class at Carnegie Institute of Technology, Pittsburgh, Pa., a student in Chemistry, has received the National Science Fellowship 1957-58,—University of California. He was a recipient also at Carnegie Tech of the George Westinghouse Scholarship. Mr. Sharp was a Cadet Captain in the ROTC. He consistently maintained a high scholastic average and won the Warner Prize in Chemistry in both his Sophomore and Senior years. His extensive extra-curricular activities included: Treasurer, Delta Skull (Jr. Men's Activities Honorary); Secretary, Scimitars (Sophomore Men's Activities Honorary); Secretary and President, Tau Delta Phi (Social Fraternity); President, Tau Beta Pi (National Engineering Honorary); Features Editor and Assistant Editor of "Technical"; Representative Scholastic Honorary to Executive Committee Student Government; Editor, "Expression" magazine; President of American Chemical Society Student Affiliates; Captain of Pershing Rifles; membership in Scabbard and Blade; Pi Delta Epsilon (Journalism Honorary); Omicron Delta Kappa (Senior Men's Active Honorary); and Phi Kappa Phi (Scholastic Honorary). He was born on 5 November 1935 in Chicago. His permanent address is 211 South 23rd St., Lacrosse, Wisconsin.

AUBREY D. SKELTON

AUBREY D. SKELTON has completed his Junior year in chemical engineering at Mississippi State College School of Science. He is enrolled in the Air ROTC unit and holds the rank of Cadet Major. He received a $100 Freshmen Engineering Scholarship award, and two Junior Engineering Scholarship awards, and also the $50 Leadership Scholarship Award of Kappa Sigma, social fraternity, of which he is a member. Listed in Who's Who in American Colleges and Universities (1956-57), Cadet Skelton won the Sons of American Revolution Award, 1956-57, and the Chemical Rubber Co. Achievement Award for Highest Grade in Freshmen General Chemistry. Other campus activities include: Adjutant of the Arnold Air Society; School Science Representative of Student Council; Vice President of Phi Kappa Phi (scholarship fraternity); Executive Council of Alpha Phi Omega (chemical engineering fraternity); Baptist Student Union; Phi Eta Sigma (honorary fraternity); Chemical Engineering Club; Omicron Delta Kappa (leadership fraternity), and Tau Beta Pi (engineering fraternity). He was born in Laurel, Mississippi, and his home address is 311 Lampkin St., Starkville, Miss.

CHARLES LLOYD SOUKUP

CHARLES LLOYD SOUKUP is enrolled in the Naval ROTC unit at the University of Wisconsin, majoring in chemical engineering. His cadet rank is Midshipmen Lieutenant (Battalion Operations Officer). He has maintained high academic averages and received Sophomore High Honors. Along with his high scholastic standing, he has managed to participate in extra-curricular activities and outside work. His campus activities include: member, NROTC Rifle Team; delegate to Mock Republican Convention; chairman of publicity committee of Tau Beta Pi, and Phi Lambda Upsilon, honorary fraternities. Mr. Soukup was born in Wausau, Wisconsin, on 25 October 1935. His mailing address is 1120 Bowen Court, Madison, Wisconsin.

DARWIN WILLAR VANSKIKE, JR.

DARWIN WILLAR VANSKIKE, JR., Cadet Wing Commander, AFROTC, was graduated this year from Iowa State College of A&MA, Ames, Iowa, where he majored in chemical engineering. Outstanding student and enthusiast in military matters, Cadet Vanskike was awarded the Chicago Tribune Silver Medal at the completion of his Sophomore year. In his Junior year he received the Chicago Tribune Gold Medal, and was initiated into the Arnold Air Society and Scabbard and Blade. At the Summer Training Unit (between Junior and Senior years) he was elected "Outstanding Cadet," and, at the beginning of his Senior year, he was selected as "Distinguished AFROTC Cadet." A member of Sigma Chi, social fraternity, his campus activities included membership in Phi Eta Sigma, Phi Kappa Phi, Tau Beta Pi, Alpha Chi Sigma, and the American Institute of Chemical Engineers. He was born on 2 August 1935 at Cedar Rapids, Iowa. His home address is 2753 Iowa Ave., Cedar Rapids, Iowa.

JOHN HENRY WARREN

JOHN HENRY WARREN, an Advanced Course Senior Cadet and chemical engineering major in this year's graduating class at University of Delaware, Newark, Delaware, attained the rank of Captain in the ROTC and was designated a Distinguished Military Student. His college activities included membership in Scabbard and Blade, Alpha Tau Omega fraternity, and Alpha Chi Sigma, professional chemical fraternity. He was born in Philadelphia, Pa., on 24 May 1935. He resides at 706 North High Street, Millville, New Jersey.

GENE ARLAN WESTENBARGER

GENE ARLAN WESTERBARGER, Cadet Captain in ROTC, and a chemistry major in the College of Arts and Sciences, Ohio University, Athens, Ohio, received the Anchor Hocking Glass Scholarship for three consecutive college years. He is a member of American Chemical Society Student Affiliates; Ohio University Chemistry Club; Phi Eta Sigma; Phi Kappa Phi; Phi Beta Kappa, and Scabbard and Blade. He was born on 25 July 1935 in Lancaster, Ohio. His home address is 650 Frederick St., Lancaster, Ohio.

DAVID GERALD WILLIAMS

DAVID GERALD WILLIAMS, AFROTC cadet Captain majoring in chemical engineering at the University of Michigan, studied chemistry for three years at Oberlin College, Oberlin, Ohio before entering Michigan. Mr. Williams' cadet assignment is Group Materiel Officer. He has maintained an outstanding overall academic average; is a member of Acacia (social fraternity) and Phi Lambda Upsilon (honorary society). He was secretary for the Junior Class of Engineers. At Oberlin College he held the position of treasurer for a men's housing group. In addition to his curricular duties, Cadet Williams has managed to direct a choral group made up of students from his social fraternity. Cadet Williams was born on 6 February, 1935, in Hackensack, N. J., and his home address is 61 W. South Street, Worthington, Ohio.

(Continued on page 38)

BUREAU OF YARDS AND DOCKS

(Continued from page 28)

temperature as high as 4000°F right at the surface of the paint or coating.

We have several requirements which are concerned in general with coatings for tanks, particularly fuel tanks. For example, we would like to know of a coating for steel gasoline storage tanks, holding aviation gasoline, which is comparable in performance to such a standard coating as vinyl resin lacquer, fulfilling existing military specifications; but more economical, easier to apply, needing only one coat, and able to be applied with standard paint spray equipment.

We are also interested in obtaining improved resinous coatings for concrete and steel tanks which take the fullest advantage of the more recently developed plastics and which are capable of resisting the solvent or degrading action of any petroleum fuels currently contemplated for use by the Navy. The prospect that storage facilities will be required for some of the new high energy fuels requires that attention be devoted to materials with properties compatible with such fuels. There has been developed a lining consisting of a thiokol base material. The main shortcoming of this lining is that about one-half of the coats required can be applied with non-hazardous solvents; the remainder require the use of hazardous solvents. It would be very beneficial to us if a coating system could be developed requiring no hazardous solvents whatever.

Along the same general line we have a need for low-cost preservative compounds for ferrous metals that are easily applied on materials to be stored, which will provide protection against deterioration for at least 5 years (and preferably up to 20 years), and do not require removal when the equipment is put in operation, or are at least easily removable when necessary.

We have, for example, used plastics such as "teflon", which are applied to form a film which is capable of protecting steel automobile parts against corrosion for an indefinite period. The application consists of cleaning, blasting, preheating, spraying, air-drying, and sintering. This is quite time-consuming and expensive. What we would like to have is a material, having the protective and ready lubricating characteristics of "teflon", that can be easily applied, and which will require no removal operation prior to being placed in use.

We are interested, along with other Navy Bureaus, in improving our knowledge of wash primer coatings. Work to date has been rather basic and intended to improve the understanding of the complex reactions, both organic and inorganic, which take place in the primer during mixing and after application to metallic surfaces, in order to make feasible the production of a more effective system which would be more generally useful for Naval purposes. The present formulations have the following deficiencies:

(a) loss of adhesive and corrosion protection properties eight hours after preparation of the formulation;
(b) gas formation on certain metals;
(c) uncontrollable polymer reactions which effect the permeability and life of the film.

We have certain problems in regard to protection of steel piling which are driven, for example, as foundations for our steel piers. These coatings must be protective to the pilings, and able to withstand driving and pulling conditions as well. Certain coating systems have been tried but none are as yet considered completely successful. It is desirous to develop a coating that will be resistant to damage by marine fouling organisms, mud-line abrasion of the sand-seawater slurry, and to driving and pulling operations.

A problem which is similar in some respects is that of providing protection to wood piling to make such piling impervious to damage by various marine boring organisms. This is a problem of long standing, and over the past 100 years many chemical treatments of wood piling have been tried with varying degrees of success. No methods, however, have equalled creosote in the preservative qualities and service life. We are at present working on three promising copper-based compounds, but we do not yet have enough data for complete evaluation. We are also performing exploratory tests for many previously untested chemicals. We are making studies on certain naturally resistant woods. We are also trying to alter creosote and creosote treatments to improve its protective qualities. General improvement in this area is needed. Such improvement, of course, must retain or be close to the economy of the present creosote impregnation techniques.

Protection of Airfield Runways

I will now bring up a slightly different type of coating problem. We need very urgently a good method for the protection of flexible pavements on airfield runways from the effects of jet aircraft operations. These effects include high tire pressures, heat and blast of the engine exhaust, and fuel spillage. The areas of primary interest are the warm-up aprons, taxiways, and runway ends. We have tested up to now many coatings for bituminous concrete pavements, but no coating has yet been successful in resisting the exhaust effects and preventing damage to the pavement. Such materials that have been tested have been of various types—some put on with a brush or a rubber squeegee; some have been thin screeded cementaceous overlays; some have been various kinds of cemented sheets or ceramic blocks. Often the problem is to keep these overlays well cemented to the basic pavement. It appears that in the near future we will have a similar problem for concrete runways. It appears that we may need concrete able to withstand around 1200°F.

We have a requirement for another type of surfacing on the main runway portions of the airfield. Here hazards are presented by spot ice. Common freezing-point depressants which have been considered are unfortunately of a corrosive nature, or are of a nature which otherwise adversely affects the pavement surface, and do not withstand low temperatures. Ice-phobic materials have not been found to be of too much value in the case of thin films of ice, and in themselves may not resist the heat caused by jet engines. In other words we require a surfacing material having freezing point depressant characteristics with possibly some ice-phobic characteristics for easy ice removal, and that can withstand modern runway operations. These coatings should be such that they do not have to be reapplied often if at all.

I will now shift to the next category, that of *lubricants.*

Lubricants Problems Discussed

We need preservatives which are to be used to protect the internal surfaces of engines and equipment power trains. Such preservatives normally have the requirement that they set-up following application to form a somewhat more viscous film so that they will not run off vertical surfaces when stored under conditions of high temperature. Unfortunately, however, this re-

quires extensive removal operations prior to reactivation of the equipment. Our requirements are for an automotive lubricant family that can serve as a combination preservative and lubricant, or that as a preservative will not interfere with the use of normal lubricants but will remain indefinitely as an impervious film on vertical surfaces; that will provide positive protection against corrosion; that will not require removal prior to equipment reactivation; and that will be compatible with operating lubricants.

Another problem is concerned with improving the adherance qualities of equipment preservatives. One approach to this would be by developing an automotive lubricant family for engines and equipment power trains having outstanding polar characteristics and with inhibitor content adequate for preserving stored vehicles and power-driven equipment for a period of at least five years. This combination lubricant-preservative may be either of conventional or synthetic type, and should be capable of serving as, or be compatible with, the operating lubricants now used, conforming to military and Federal specifications. This lubricant family should be available in all SAE engine and gear lubricant grades.

Rubber and Other Materials

I will now shift to some of our requirements in connection with *materials*. Many of these requirements are related to rubber or rubber-like materials. We would like, for example, to be able to use rubber which is capable of long period of storage life over the range of normal storage conditions. Any improvement over normal storage life would be desirable, but for some articles, such as gas masks, a 20 year life is the practical goal toward which we are striving.

A specific problem along this line is in connection with gaskets for bolted steel tanks used for fuel storage. We are seeking an improved gasket, either rubber or a substitute for rubber, that will provide at least the same life as rubber and at no greater expense, without some of the disadvantages of rubber.

We have among other things a problem of the effect of low temperature on almost all rubber-like materials. As you know, rubber passes at normal temperatures from a soft, easily-deformed and elastic state to a more rigid one and finally to a brittle, glass-like condition. It is recognized that improvements are being made in this direction, and in fact this problem may already be economically solved; but we have not found just exactly the right answer for our Bureau's requirements.

A specific example of a requirement for rubber or a rubber-like substance is a need for an elastomer usable for vehicle tires and other mechanical goods stock that will satisfy the arctic and tropical operating requirements, and, in addition, be capable of resisting deterioration for long storage periods, say, 5 years. Such material should not only have long storage life but should have an operating life equal to or greater than that of presently used materials.

A rather odd but interesting problem concerns the necessity for determining the characteristics of certain commercial items, especially of a plastic type, which make them susceptible or impervious, as the case may be, to damage by termites and similar pests. Such items of material as plastic coverings for buried cable, joint sealers for concrete slab construction, and fabricated cellulose building products have been subject to such damage. Guide-lines are needed for the selection and use of termite-resistant materials in order to prolong structural life and reduce repair costs.

There are a few *miscellaneous* problems not falling into any general category which I would also like to bring to your attention. We have a need, for example, to find a type of disinfectant which is better than bleach or hypochlorite solutions, and gives improvement in one or more of the following factors: cost, long storage capability, and safety in use. We would be interested in disinfectants which would be effective at low temperatures, also.

We are also interested in finding a moisture-proof, inexpensive container for storage of bleach, in the 50-pound size, which will not deteriorate as a result of action by contents or the outside environment during storage periods from 5 to 15 years.

We have a need to develop a chemical process for the stabilization of beach sand so that roads can be quickly constructed and immediately used by an amphibious landing force and its equipment. This is an extremely difficult problem, but one which is enormously important. Any method devised should be usable under combat conditions, should not employ large quantities of chemicals, use materials if possible which are non-toxic and non-flammable, and should not require extensive physical mixing with the sand itself. It is hoped that such stabilization can be obtained by applying the material by injection or surface spraying. It is desired that roadways be usable by heavy equipment within 20 minutes after the application of the stabilization technique. The method must be applicable to both wet and dry sands. We have tried a large number of chemical sand stabilizers in the attempt to solve this problem. The most promising of these, an aniline-furfural combination, was perfected to a point at which it could be used to construct a quick-setting roadway, but this process required physical mixing with the sand, was hazardous to personnel, required tremendous quantities of chemicals, and needed much heavy, slow-moving equipment. The technique was expensive and not very simple. The service life of the equipment was rather limited. We have abandoned any work on this program but are always looking for a possible new approach to the problem.

Another problem of interest is to devise a method of removing asphalt from drums that is not as difficult and time-consuming as the present process. Normally heat is applied to the drums, but this method is not very fast. We would like a new type of drum with an internal coating to which asphalt will not adhere, that will permit ready removal without heat application. We are considering the use of tapered drums as one possible solution. The drum need not be of the reusable type.

This concludes my presentation; and I wish to thank all of you for your kind attention. As I stated at the beginning of my talk, we would be very happy in the Bureau of Yards and Docks to discuss any potential solutions to these problems. I will again request that when you come to the Bureau, you contact the offices I mentioned before; and be sure to bring with you all available technical data which will support your contention that you have a solution to one of our problems. Thank you very much.

H. A. KUHN
Consultant
Chemical & Industrial
Reports • Surveys
1426 G Street N.W.
Washington 5, D. C.

PROPRIETARY RIGHTS

(Continued from page 23)

contract with Doe Corporation contained not only the patent rights clause which grants license rights to the Government in inventions made pursuant to contract requirements, but also a clause granting rights to the Government to reproduce and distribute drawings and technical data delivered under the contract.

Now, if the contractor had developed the generator from the start pursuant to Government contract requirements, there would be no one who would seriously complain that the Government should not be permitted to have the generator produced for it on a competitive bid basis. There is a general feeling that since the contractor will not have expended any of his own funds in the development that because of such expenditure the Government should retain the right to get the best price pursuant to competitive procurement. However, as in the case of the Doe Corporation, when the contractor delivers an item of equipment or a process, paid for independently by the contractor, at least in substantial part, it will be seen that there would be room for disgruntlement when detailed drawings and manufacturing information incorporating such independently paid for information are turned over to a successful bidder, who without the burden of amortizing development costs comes into possession of such "know-how" and trade secrets because he has a Government contract.

Of course, if the contractor has patents which cover his independently developed process or device then he can use these to prevent the successful bidder under a Government contract from utilizing the technical information for commercial production. However, the contractor who has no patent coverage will have no means for preventing a competitor who is successful bidder under a Government contract from using technical data obtained from the Government, for commercial production. It was in recognition of this problem and the need to carry out the general policy of the Government that the proprietary rights will be respected that Part 2, Section IX of the ASPR was written and has now been published. This Part 2, entitled "Data and Copyrights", deals with technical information, whether or not copyrightable. What do we mean by technical information? Technical information, falls into three categories: "Ordinary Information, Information contained in patents, and Information embodied in trade secrets and 'know-how'."

Ordinary information is to be found in the common experience of persons skilled in the art, in textbooks, and in expired patents. It is a part of the public knowledge and no one can assert private rights.

Unexpired patents confer on the patentee or his assignee the right to prevent others from practicing his invention for a period of years. Even though the Government will obtain a license for Government purposes in the new patented inventions arising out of research and development work, the contractor retains title and can assert the patent against anyone who seeks to compete in the commercial field of the patent owner.

The third category of Trade Secrets and Know-how includes such information as the precise temperatures for heating, in the case of processes and designs for internal components in a mechanical apparatus. Special instruction is necessary in order to duplicate such processes and designs.

The law recognizes proprietary rights as incorporated in patents, copyrights, trade secrets and technical information and Part 2, Section IX, ASPR, will, I believe, be a step toward carrying out the Government's policy of recognizing such proprietary rights. Just as the clauses pertaining to patent rights incorporated industry's viewpoints, the draft of Part 2, Section IX was circulated among industry and industry's comments were seriously considered and whenever possible were incorporated in the regulation.

Part 2, Section IX, states that as a general policy no data should be asked for that isn't needed. The thought is that normally, all that the Government should require is operational and design data, and not data which is in sufficient detail to be used for remanufacturing purposes.

The difficulty is in determining just what data is needed. Many times data is required for internal use in substantially the same detail as would be required for remanufacturing an item of equipment. For example, the cataloging people in the Government need to be able to identify an item of equipment. The only way they can identify it is to see if the dimensions, the tolerances, the heat treatment, etc., are the same as another one. If they find that both are the same they can decide that procurement of both is unnecessary and uneconomical and that only one may be stocked. There is no way of telling however, unless detailed manufacturing information is procured.

Again, assume that a given design manufacturer has insufficient facilities to produce in the quantities necessary to satisfy Government requirements. Here there is the option of spending great sums of money in setting a design manufacturer up into large scale production or utilizing the services of a company who already has such facilities. It will be clear which course will save more of the taxpayers money.

In both of the two mentioned examples the Part 2, Section IX authorizes the contracting officer to obtain remanufacturing type data on the basis of specific negotiations for such data. Negotiations for price will of course be different for the cataloging requirement than for remanufacturing. In order that the contractor may be assured, in the case of use of manufacturing type data for the cataloging requirement, that the Government will not disseminate data to a competitor, the contractor will be permitted to limit use by the Government of such data by a restrictive handling notice stamped on the technical data. This notice will apprise all Government users that the data is not to be disclosed, used or duplicated for procurement or remanufacturing purposes without the permission of the contractor.

Palladium Ammonium Chloride, Palladium Black
Diammine
oxime,
Palladium
Aldehyde, Palmitoleic Acid, Palmitoyl Chlori
Pectinolytic Enzymes, Pellidol,
Pentaacetyl-d-gluconononitrile,
chlo
dec
to

OVER 20,000 CHEMICALS IN STOCK!

Write for Our New 138-Page Catalog!

DELTA
PIONEERS IN CHEMISTRY

DELTA CHEMICAL WORKS, Inc.
23 West 60th St. New York 23, N. Y. PLaza 7-6317

Part 2, Section IX of the ASPR divides types of contracts into two broad categories. These are supply contracts and research and development contracts. The rights to use drawings and technical data may be different for each type of contract.

Let us assume the case of a supply contract for borane high energy fuel. If the prospective supplier has already developed borane at his own expense, and the need has been established for manufacturing data providing information concerning the contractor's trade secrets and manufacturing processes, which the contractor has the right to protect then negotiations for rights to use such data are authorized by the new clause. The price to be dependent on the intended Government use. Remember here the difference between use for manufacturing purposes and internal cataloging. If the use of the data is for remanufacturing purposes and the Government pays for the rights to use the data for manufacturing purposes, then the clause will grant unlimited rights to the Government to utilize the data for all purposes, including second source procurement. If, however, the use by the Government is for operational purposes for internal use of the borane data, then the limited rights clause will be used. This means that the Government will obtain the right to use the data only for the internal use. No right will be authorized to reproduce and disseminate the data to anyone outside the Government. The restrictive handling notice on the data will operate to prevent unauthorized disclosures.

I would like to emphasize here that the contractor has the burden of pointing out that his proprietary information is incorporated in the report or technical data which he is required to furnish pursuant to contract requirements as the person most familiar with the fact that this condition exists in any particular case.

The other broad category of contracts is research and development. With respect to data required in such R&D contracts, which has developed prior to the contract, the regulation provides that remanufacturing type data should not be required as part of contract requirements unless such data is necessary to permit the remanufacture of the equipment or process developed under the contract. That is, unless background data incorporating trade secrets and know-how is actually essential to teach the manufacture of equipment developed under a contract, it should not be a requirement of the contract that such data be furnished. Here, however, there is a variance from the procedure set up for supply contracts. In R&D contracts when proprietary remanufacturing data is necessary, no election is permitted as to whether the Government should obtain limited or unlimited rights to use such data. So long as such data is necessary, the regulation permits negotiations with the contractor for unlimited rights to use the proprietary rights data for remanufacturing purposes.

Here again, however, the regulation interposes the new thought that data incorporating proprietary rights may be required for remanufacturing purposes not as a matter of right but only after appropriate negotiations are entered into with contractors.

In summation, when the program contemplated by the new Part 2, Section IX, is fully in effect, the Government will either have the full right, purchased pursuant to negotiations therefor, to reproduce, use and disclose proprietary data for all purposes, or will only have the right to use such data for internal use. There will no longer be the problem of ineffective notice to Government personnel because the technical data itself will spell out the Government's rights.

Another problem area has been the recognition of proprietary rights as involved in the evaluation and test of unsolicited disclosures of inventions, ideas and proposals. Evaluation of unsolicited ideas and proposals contemplates receipt by Government engineers of technical data which was not developed under contract. Inventions, ideas and technical information is involved which was independently developed. Since for the most part background proprietary information is involved, we are concerned with the problem of encouragement of persons and organizations to come forward to have their new ideas and inventions evaluated for possible D.O.D. use, even though these may embody proprietary information. When any such ideas or inventions are found, pursuant to thorough evaluation, to be of military value, then negotiations would be commenced with submitters either to purchase rights to permit the Government to have the invention manufactured or to contract with the submitter for such manufacture, if the submitter has the facilities.

In the matter of acceptance of unsolicited inventions or proposals for test and evaluation, there has been a recent reversal of policy. It was formerly the Air Force policy not to accept disclosures in confidence. Some Government evaluators feared that acceptance of disclosures in "confidence"—that is with a notice that the information is not to be disseminated—would result in great numbers of suits against the Government and its personnel in the event of inadvertent disclosures. There was the further fear that the information submitted on a "confidential" basis could turn out to be ordinary "type information," that is information already independently developed by the Government or available in expired patents or text books, and neither the Government nor the submitter of such information would have knowledge of this fact at the time of the submission for evaluation and test. However, the question has been resolved in favor of the submitter. Whether or not an idea, process or invention is submitted in "confidence," it is handled in accordance with procedures calculated to prevent unauthorized disclosures. If the information turns out to be known to persons skilled in the art then it would appear that the submitter would suffer no damages in the event of inadvertent disclosure.

In conclusion, I'd like to leave you with this—The Government is making great efforts to protect the proprietary rights of contractors and submitters of unsolicited proposals or inventions. It is hoped that these efforts will stimulate the free flow of information in reports and technical data required in the performance of contracts and also provide incentive on the part of submitters of unsolicited proposals or inventions to come forward to have their independently developed ideas evaluated.

A.F.C.A. DIRECTORY

The new 1957-1958 Directory of the Armed Forces Chemical Association is now in process of preparation. Members are urged to send in to the Secretary-Treasurer without delay any changes in addresses desired.

TECHNICAL PROGRAM PLANNING DOCUMENTS

(Continued from page 22)

development. These documents are essentially studies which span the whole field of development. Each covers an area of endeavor—for example: propulsion, aerodynamics, bombing, navigation, communications, human engineering, and so forth.

THE TPPD for each area contains four sections.

Section I. *A Statement of the Military Problem*—In this section conclusions are reached as to the environmental and performance conditions which define our research and development objectives in that area.

Section II. *Present Air Force Capabilities and Limitations—Subtracting* our present capabilities from future required capabilities yields a difference which provides the magnitude and direction of our R&D effort.

Section III. *Technical Possibilities*—This is a collation of data drawn from research results, proposed innovations, and suggestions regarding possible avenues of development.

Section IV. *Technical Requirements (TR's)*—Here is where the desired performance objectives are spelled out explicitly and represent the order for action to our development Centers. TR's are broad statements of performance objectives upon which Centers base their development programs, consisting of projects, tasks, contracts, along with a statement of required resources, and so forth. As you can see, the scientific and industrial people in receipt of these documents have in their hands the same information and guidance which Centers receive from Headquarters ARDC for planning their year-to-year R&D programs.

At this point, no doubt, you may have many questions, such as:

A. Who is eligible to receive TPPD's and how does the "Need-to-Know" apply?

B. How to go about getting TPPD's initially and from year-to-year as they are revised?

C. What part does ASTIA (Armed Services Technical Information Agency) at Dayton, Ohio, play?

D. What are the Centers' responsibilities under the release program?

E. What about security requirements?

F. And not of least concern—What are the responsibilities of the organizations in science and industry who participate and receive TPPD's?

TAKEN one at a time the answers are as follows:

A. First, who is eligible to receive TPPD's and how does the "Need-to-Know" apply?

Answer: Any organization which is an R&D contractor or, because it has the capability, is likely to become an R&D contractor, is eligible to participate in the TPPD release program. Each organization is required to establish its eligibility at the time it requests specific TPPD's. Each case is reviewed for approval by a Special Headquarters ARDC Board. Furthermore, the technical personnel in the Headquarters who write the TPPD's screen the specific document requests to assure that applicable TPPD's are released in each case.

As you know, under the normal concept of "need-to-know," the release of classified information on a scale as broad as I have just described would not be possible. The services of many organizations which have considerable R&D capabilities and are not under contract with ARDC agencies are lost to the Air Force. Therefore, in order for the program to achieve the objective established by the Commander, ARDC, the "need-to-know" for this purpose alone has been expanded to include organizations which fall under the general terms of eligibility just expressed.

B. Second, How do you go about getting TPPD's initially and from year-to-year as they are revised?

Answer: To initiate your participation in the program, all that is necessary is to write Headquarters ARDC and request it. In reply, we supply the necessary information and paper work, and ask the requestor to outline his R&D capabilities in the technical areas of the specific documents desired. However, because of limited Headquarters facilities, this is where the cooperation of each interested organization is a *must*, if the program is to be administratively possible.

Most industrial and scientific organizations have many departments, divisions, and offices, which desire access to these documents. We urge that each interested organization designate an individual or *one* office as the point of contact with our Headquarters. And we ask that this point of contact assume the responsibility for determining the overall document needs of the organization and for conducting all necessary action to obtain the documents and distribute them internally within the organization. In this manner, the administrative burden on Headquarters ARDC is held to a minimum, which permits much speedier processing than otherwise possible. This program now encompasses hundreds of organizations, and you can quickly see what would occur if we established even two or three separate contacts with each organization. Because of the many steps involved in the processing of requests, the Headquarters could not continue the program under such an added and unnecessary burden.

At the end of each fiscal year the TPPD's are revised and reissued. For example, during FY 56 (1955) we had 47 documents. At the beginning of FY 57 (1956), this number was reduced to 36. Today there are 34. Only a few technical endeavors were deleted entirely, but many were integrated in related TPPD's. When the new issue is ready for distribution, each former recipient is informed of the availability of the new TPPD's. If changes have been made in the titles or numbers of documents he is advised as to which ones replace those he has on hand. At the same time, we ask the former recipients to verify their desire to receive the new TPPD's. Upon completion of this action, the release office at Headquarters ARDC informs ASTIA of the specific documents to send. No automatic distribution of TPPD's is made, for security reasons. In this manner, each established participant is assured of timely receipt of new TPPD's from year-to-year.

C. Third, What part does ASTIA play?

Answer: ASTIA has been assigned the function of the printing, distribution, and recall control of the TPPD's. Let me make it clear now that TPPD's *cannot* be obtained initially by requesting them of ASTIA. Approval for initial distribution is the responsibility of the Headquarters. Just prior to the time when the annual revisions are ready for distribution, ASTIA contacts each former recipient and asks that either the documents on hand be destroyed under Government supervision at the recipient's facility and evidence of this, in order to clear their accountability records, furnished ASTIA, or that the TPPD's be returned to ASTIA for destruction. This must be accomplished before ASTIA can forward the new documents, since they are considered to be on loan only and, under release policy, those superseded may not be left outstanding.

D. Fourth, What are the Development Centers' responsibility under the release program?

Answer: The Centers have a very important role in the release program. They have the responsibility of discussing and clarifying the technical details of TPPD's with representatives of the recipient organizations. The Center responsible for each TR is indicated in Section 4 of each document. Naturally, certain release limitations prevail here, such as the protection of the proprietary rights of other organizations and, of course, the Center cannot divulge imminent procurement information. Other than these considerations, the Center personnel have been instructed to fully discuss the technical areas pertaining to the TPPD's with your authorized representatives. This policy, of course, is in addition to the normal manner of conducting business as it prevailed prior to the TPPD release program. The function of providing supporting information appropriately rests with Centers instead of Headquarters ARDC, because the project engineers in the Centers are all familiar with the problems. The Headquarters personnel are the managers of the over-all R&D program.

In addition to directing your visits to Centers when they concern TPPD's, we urge also that any ideas or unsolicited technical submissions aimed at Air Force requirements be directed to the responsible Center for evaluation. Here again, the Centers are best equipped to provide sound and timely evaluations. In fact, in almost every case, any such submissions received initially by Headquarters ARDC will be referred to the appropriate Center for evaluation, and to do so at the outset will save work for the Headquarters personnel and time for the submitter.

E. Fifth—What about security requirements?

Answer: Because most of the TPPD's are classified Secret, appropriate security clearances for receiving and storing the documents are required. However, if an organization desiring TPPD's otherwise meets our eligibility requirements, we can take action to have its current clearances upgraded or request that action be taken to effect new clearances in order to get the information to the proper people.

F. Sixth, and not of least concern—What are the responsibilities of the people in science and industry who receive TPPD's?

Answer: Under the TPPD release program, the organization receiving TPPD's has only a moral responsibility, flavored and toned with the desire for mutual benefit, to come forth with all conceivable solutions to Air Force technical problems in the interest of national security. No attempt is being made by Headquarters ARDC to establish any definite R&D activity, or to monitor any projects that may be generated as a result of the TPPD release program. It is our intent to furnish guidance and orientation with respect to future planned Air Force goals in technical development, but no obligations are incurred by either party. As a matter of fact, a policy agreement to this effect must be signed by an official of each participating organization.

What the ARDC does hope for is an influx of unsolicited innovations, bold advances compared to current capabilities, proved feasible by the submitter, and aimed at drastically lifting Air Force superiority; not marginal improvements to existing facilities and capabilities.

If the TPPD release program is to succeed in its objective to foster an Air Force-Science-Industry Team-concept and achieve greater strides in R&D by guiding everyone's efforts in a consistent direction, not only are the good intentions of the Air Force required, but also the understanding and cooperation of Science and Industry. And if history is any indication of the future, I know we can count on your cooperation.

R.O.T.C. CADETS

(Continued from page 32)

MONTE DALE WITTE

MONTE DALE WITTE, a Junior this year (1957) majoring in chemical engineering at the University of Oklahoma, is a member of the ROTC, with rank of Sergeant First Class. He has maintained a high scholastic average and his college activities include: President and Secretary, in 1957 and 1956, respectively, of Delta Chi, social fraternity. He was Secretary-Treasurer in 1957 of American Chemical Society Student Affiliates, and was also a member of Alpha Chi Sigma and Phi Eta Sigma, honorary fraternities, and the American Institute of Chemical Engineers. He was born on 8 August 1937, in Dallas, Texas and his home address is 7422 Forney Road, Dallas, Texas.

GERALD P. ZIEMBA

GERALD P. ZIEMBA, chemical engineering student at Detroit University, is a second-time winner of A.F.C.A.'s ROTC award. He entered Detroit University under the cooperative curriculum (alternate three months work with industry and school attendance periods), in the college of engineering, in February 1952 and won the A.F.C.A. award in 1955. He has worked for the Ford Motor Company and the Wyandotte Chemical Corporation during his cooperative work periods. Cadet Ziemba has attained the rank of Cadet Lieutenant Colonel, Corps Executive Officer. Included among the campus honors accorded Cadet Ziemba, in addition to the A.F.C.A. awards, are: American Institute of Chemical Engineers Medal of Honor for Scholastic Ability; Vice President Junior Class; President of the Society of American Military Engineers; Vice President of Alpha Gamma Upsilon Fraternity; Distinguished Military Student—ROTC; member of Blue Key Honorary Fraternity; winner of Chicago Tribune Award (Pre-Senior Class 1956), and member of Student Council, and Engineering Student Council. He was born on 24 April 1934, in Simpson, Pa. His permanent address is 715 Main St., Simpson, Pa.

SCIENTIFIC RESEARCH SOCIETY

EDGEWOOD, MD.—Dr. Wallace Brode, director of the National Bureau of Standards, recently presented a charter to the newly-founded Army Chemical Center chapter of the Scientific Research Society of America. Installation ceremonies were held at the Officers' Open Mess.

President of the local organization is Dr. William H. Chambers. Dr. Stephen Krop is vice president.

THE FORWARD LOOK IN THE ARMY CHEMICAL CORPS

(Continued from page 27)

shall undermine the physical health of our enemies as we shall break down their moral resistance." He did not use these weapons because he feared our power of retaliation. If he had not had such fear, our men may have had to face gas attacks as well as withering gun fire on European beach-heads. The lesson in this is that in our modern warfare planning we cannot neglect any system which an aggressor can use against us.

Therefore, the Army Chemical Corps, like other branches of the military services must move forward in their planning, their thinking, and in their preparations. We must constantly re-evaluate our resources to bring the greatest weight to bear on those points which offer promises of significant achievement, so that in this atomic age, we can be fully effective in our contributions to defense.

I have not implied that all our problems have been identified and solved. I don't expect that we shall ever come to the stage when we can say that there is nothing more that can be done to assure the complete ability of this country to defend itself against any possible type of warfare. Warfare concepts keep changing as new ideas and developments come into being. For this reason we can never remain static. We must keep changing, and keep moving forward with the times.

In our own particular field, one of the great barriers to the full exploitation of the potentialities of the toxicological munitions systems is the general lack of factual information, and realistic thinking based on those facts.

In the words of President Eisenhower, "the strength of our arms is always related to the strength of our minds—panic comes like a storm and calamity comes like a whirlwind to those who hate knowledge—."

The need for knowledge about toxicological warfare and defenses against it has never been so great as it is today. The statements which I quoted in the first part of my talk give us ample warning that our potential enemies do not by any means underrate the potentials of toxicological warfare.

An avowed purpose of our preparations in atomic warfare is to develop a retaliatory capability so great that it will deter possible enemies from ever using nuclear bombs—just as fear of our retaliatory capacity deterred the Axis nations from trying gas or biological warfare in spite of Hitler's avowed intentions.

If we came to the point of stalemate in atomic weapons, would an enemy determined to destroy the United States forget the whole thing? Or would he turn to alternate weapons systems in which he had superiority? I believe plain logic will answer that question for you. Therefore, it behooves us to be far enough advanced in this field to make it unprofitable for an enemy to use chemical or biological weapons.

The decision by an enemy to use chemical, biological, and radiological warfare, if it comes, might be made on very short notice. A nation not sufficiently prepared and informed would face disaster. We must be an informed nation. It is most important that a wider public understanding of the toxicological weapons be achieved. We must obtain wider application in our civil defense system of the defensive items that have been developed. We must take full advantage of the strides being made by industry in all forms of research that may be of significance in our search for new or improved agents.

There are many ways in which you can help us. You can help us with ideas. You can give us the advantage of your experience and skills in research and development. You can help us in disseminating greater knowledge of the facts about toxicological warfare. On this point I should like to say that we need positive action by you even more than suggestions as to how we may do it, although we welcome these too. But you must realize that a number of considerations enter into our activities in this area—including those arising from relations in the international field. However, you as unofficial sources can do much more to spread knowledge than we can, as a government agency.

The relationship between the Army Chemical Corps and the Armed Forces Chemical Association is a close one, and it must be even closer. It exemplifies the close inter-dependence of industry and the military services in facing the common problem of achieving the moral and physical strength to meet any threats from aggressors.

We must all look forward.

U. S. Army Photo

Major General William M. Creasy, Chief Chemical Officer, U. S. Army, presents the National Safety Council Award of Honor to Col. Russell W. Dodds, Commanding Officer of Pine Bluff Arsenal, Ark., during the Armed Forces Chemical Association Meeting on May 22 in Washington, D. C.

CHEMICAL CORPS AGAIN HAS OUTSTANDING SAFETY RECORD

For the second year in succession the Chemical Corps, among all the technical services of the Army has won the National Safety Council Award of Honor for its outstanding safety record in 1956. Presentation ceremonies were held at the Pentagon on June 12.

In addition, three of the Chemical Corps major installations won safety awards for their 1956 records. Presentations of these awards were made during the 12th Annual meeting of A.F.C.A., in Washington. The National Safety Council's Award of Honor, a bronze plaque, was won by Pine Bluff Arsenal for highest percentage of reduction in accidents in 1956 among all Chemical Corps installations as compared with records for the two previous years, together with its rating of excellent on certain safety precautions. The plaque was presented to Colonel Russell W. Dodds, Pine Bluff Arsenal Commander, by Major General William M. Creasy, Chief Chemical Officer of the Army.

Dugway (Utah) Proving Ground, with a record of safety improvement only slightly lower, won the Army's installation award, an engraved scroll. Colonel David Armitage, the post Commander, received the award for his installation from General Creasy.

The A.F.C.A. award, a bronze plaque, was made this year to Rocky Mountain Arsenal on the basis of a percentage accident rate reduction for three years. Colonel Donald Grothaus received the award presented by President Glenn A. Hutt.

THE MILITARY CHEMICALS PROGRAM

By KEITH H. JACOBSON

Coordinator of Military Chemicals Program

Directorate of Medical Research

CHEMICAL WARFARE LABORATORIES

Army Chemical Center, Maryland

THE EXTENSIVE toxicological facilities of the Medical Research Directorate, Chemical Warfare Laboratories, are used largely for toxicological evaluation of chemical warfare agents. However, as the largest toxicological facility within the Defense Department, these toxicology laboratories have become involved in studying the toxic hazards of chemicals, other than CW agents, of interest to the military services. Unlike CW agents, these "military chemicals" are only incidentally toxic, i.e., they are used because of their physical or chemical properties, but they also have toxic properties. Among the examples of these materials are guided and ballistic missile propellant fuels and oxidizers, jet fuels, fire extinguishants, solvents, cleaners, explosives, lubricants, hydraulic fluids, exhaust products, and intermediates in the production of any of the above materials.

In the late 40's several Defense laboratories, aware of the extensive toxicological facility at the Army Chemical Center, asked for toxicity evaluation of several candidate materials, especially of propellants. The number of requests for such evaluations increased, culminating in the establishment of the project "Health Hazards of Military Chemicals" by the Chemical Corps Technical Committee in 1949, on the request of several technical agencies in the Army, Air Force, and Navy, and with financial support from these Services.

Considerable thought and planning went into the establishment of the project. The late Dr. J. L. Lilienthal, of the Johns Hopkins School of Hygiene and Public Health, was a prime mover in the early planning, and other eminent authorities in the field of occupational health also advised on the approaches to various problems. Brigadier General John R. Wood, USA-Ret., then Colonel, MC, Commanding officer of the facility, at that time called Medical Division, played an extremely important part in the organization of the program. A casual review of his correspondence with several agencies in the Services shows his keen insight into the needs of these Services as well as a clear understanding of the way in which the Medical Division should function in order to meet these needs.

It was evident that the laboratories in toxicology, pharmacology, pathology, and clinical investigation were readily adaptable to meet the needs of the military chemicals program. While an additional staff was required to carry out the work, the excellent staff of pharmacologists, toxicologists, and other specialists already on hand for CW research was available for guidance and advice, and in some cases for part-time assignment to the military chemicals staff.

Dr. Jacobson received his BA in chemistry in 1940 and MA in chemistry in 1941, both from the University of South Dakota. While serving in the U. S. Navy, from 1943 to 1946, he earned his BS in Meteorology from New York University in 1944. From 1946 to 1949 he was a Foundation Tanner's Council Fellow, and in 1949 was awarded a Ph.D. for his research in collagen chemistry. Dr. Jacobson is a member of the Armed Forces Chemical Association and a number of professional societies. He is the author of various scientific articles.

A LARGE NUMBER of compounds and mixtures have been studied under this program since it was started about 8 years ago. Among the materials investigated are fire extinguishants like monochloromonobromomethane, difluorodibromomethane, and trifluoromonobromomethane; propellant fuels like aniline, furfuryl alcohol, ethylene oxide, n-propyl nitrate, hydrazine, methylhydrazine, uns-dimethylhydrazine, JP3-, JP4, diborane, pentaborane, and other boron hydrides; lubricating oils like sebacate, azelate, adipate, and pelargonate esters; and JATO exhausts. This list is not complete; the complete list would be rather long. Most of the research has been unclassified, and many technical papers have been published in scientfic journals. The results of this research have been of immediately practical value to the sponsoring agencies, and have contributed much to the fund of medical and toxicological knowledge of our nation.

While there is not a set formula for the manner in which a particular compound on which one of the Armed Services requests toxicological studies may be handled, there are various procedures that may be followed. Its general ranges of toxicity are established, usually by "range-finding" toxicity tests, by various routes of administration. These usually include vapor inhalation, and cutaneous and ocular application. If warranted by the importance of the compound, by the use to which it will be put, and by the nature of the range-finding results, a more refined evaluation of its acute toxicity, again by various routes of administration, may be carried out. Often a study of its chronic toxicity follows. These studies are carried out by toxicologists in close collaboration with pathologists. The results are put to various uses: in some cases they may serve as the basis for the rejection of a highly toxic compound if less toxic substitutes are available; in other cases, the information guides the using agencies so that toxic injury to personnel handling these chemical materials may be minimized. The pharmacological and biochemical mechanism of action of many compounds are also studied. The information from these investigations is necessary for development of therapy for accidental poisoning, and in many cases for development of diagnostic techniques. The whole emphasis in the military chemicals program is the prevention of toxic injury in the handling of various chemicals essential to the advancement of military technology.

THE ARMY, Air Force, and Navy all have an interest in the work of the military chemicals project, and all help support the work by transfer of funds to CWL for this purpose. The nature of the work and the great interest in the results, consistent with the high priority of the project, require a great amount of liaison, on matters pertaining to financial support and other administrative matters, but mainly pertaining to technical aspects of the project. This liaison is normally carried on by the program coordinator. He is not only a contact point for liaison between CWL and other agencies, to

bring necessary results to the attention of key persons in the Army, Navy, and Air Force, but he also coordinates the program within the Medical Research Directorate. In this latter function, the coordinator effects liaison between the various laboratory units, helps translate practical Service problems into laboratory problems, and serves as a "feed-back" mechanism, to learn how laboratory results were applied to facilitate improvement in experimental investigations. All the past coordinators of this program are still with the CW Labs! they are W. H. Chambers, E. H. Krackow, S. D. Silver and S. Krop. These men did much of the pioneer work in establishing the laboratory staff, in evolving laboratory procedures, and in working closely with the many Service representatives who had a keen interest in this program. Considerable midnight oil has been burned by them, in keeping with the high priority of this program and as necessitated by the great number of close contacts throughout the Defense Department.

The results of the various toxicological, pharmacological, biochemical, clinical, and pathologic investigations performed under this program are conveyed to the sponsors by personal contact as well as by letter reports. The results are usually published as Chemical Warfare Laboratories Technical Reports. Many of the investigations are published in scientific journals. Another type of report that escapes general notice, but is probably the most important of all to many, is the handling manual (sometimes called safety manual) that is prepared for many compounds. This manual offers guidance to using personnel to prevent injury from toxic exposure, explosion, or fire caused by any specific compound. CW Labs personnel usually help in preparation of these manuals, which are frequently published as tri-service manuals. In this connection, it should be noted that any given material is usually of interest to more than one service and is frequently of interest to all three.

The Military Chemicals program is a phase of toxicology not included in the original planning of the laboratories at the Army Chemical Center. However, the program has fitted in well with the chemical warfare research, and has added depth to some aspects of chemical warfare research. This program is another example of the ability of the Chemical Warfare Laboratories to perform essential services to the Armed Forces.

LAB FOR STUDY OF WOUND BALLISTICS IS DEDICATED

ARMY CHEMICAL CENTER, MD.—Dedication ceremonies marking the formal opening of a "Wound Ballistics Facility" here, a $450,000 addition to the Army Chemical Corps research installation at this station, were held on April 11.

The Army's Surgeon General, Maj. Gen. Silas B. Hays; the Quartermaster General, Maj. Gen. K. L. Hastings, and the Chief of Ordnance, Lt. Gen. Emerson B. Cummings, all of whom have a special interest in the work to be done in this new laboratory, were on the lists of speakers, as well as Maj. Gen. William M. Creasy, the Army Chief Chemical Officer, and Brig. Gen. Marshall Stubbs, Army Chemical Center Commander.

The laboratory is the only one of its kind in the United States. It is used to study the effect of bullets on various materials. From these studies on what a bullet does to a gelatin or other "dead" target, scientists at the laboratory are able to predict what would happen to living targets, and can then advise on the kinds of care and treatment the injury would require. This work also facilitates the development of body armor.

—U. S. Army Photo

ARMY CHEMICAL CENTER, MD.—This building houses the Chemical Corps' new "Wound Ballistics Facility," a branch of the Chemical Warfare Laboratories dedicated in ceremonies here on April 11.

In their research, the scientists need to measure time down to a few millionths of a second. Ordinary camera pictures are useless and blurred; the laboratory must, therefore, use special X-ray machines which take an X-ray in a millionth of a second. Some of these devices have been perfected by the laboratory staff.

Dr. Carl M. Herget of the Medical Research Directorate, is chief of the new facility.

AEC REPORTS PRICE LIST

A new free price list of Atomic Energy Commission unclassified research reports for sale by the Office of Technical Services, U.S. Department of Commerce, is now available from OTS on request.

This cumulative listing of more than 3,600 AEC reports contain 454 items acquired since June 30, 1956. To obtain the new list, request AEC Research Reports Price List No. 27 from OTS, U.S. Department of Commerce, Washington 25, D.C. Price lists are issued semi-annually, and the next list will be available in August 1957.

STERILIZATION OF SEWAGE BY IRRADIATION HOLDS PROMISE

Preliminary experimental studies indicate that sterilization of sewage or waste by irradiation is feasible, the Department of the Army announced recently.

The studies, carried out by the Armour Research Foundation, Chicago, under a contract with the Army Chemical Corps Biological Warfare Laboratories at Fort Detrick, Frederick, Md., consisted of a technical and economical evaluation of the potentialities of sterilizing waste materials in both small and large quantities.

It was concluded that a nuclear reactor providing heat or electrical energy might be used at the same time to sterilize sewage for as little as one-quarter of a cent per gallon.

Waste would be used as a secondary coolant and would pass between the reactor and the thermal shield rather than through the reactor core. Experimental work showed that a suspension of a virus and one of bacterial spores were completely sterilized by isotope irradiation (primarily gamma rays).

About 2,000 times as much radiation is required to kill a bacterial spore as is fatal for a human.

Using this experimental technique, it would cost about 16 cents per gallon to sterilize sewage. This would be lowered to about 1.4 cents per gallon if a nuclear reactor were used, and, by using the sewage as a secondary coolant, the cost might drop to one-quarter of a cent per gallon.

It does not appear, the announcement states, that waste sterilized by irradiation would be radioactive enough to present any public health menace.

CHEMICAL CORPS NEWS

RETIREMENT CEREMONY HELD FOR FIVE OFFICERS AT McCLELLAN

FORT McCLELLAN, ALA.—On the occasion of their retirement, five officers were honored with a parade here on May 31. Reviewing officer for the retirement parade was Brigadier General William R. Currie, Assistant Chief Chemical Officer for Plans and Doctrine, who came to Fort McClellan from Washington, D. C., especially for the event.

The retiring officers were: Major Manley H. Trumble, Executive Officer of the 100th Chemical Group; Major George P. Smith, Assistant Chief of Personnel and Administration Division of the Chemical Corps Training Command; Captain John J. Breitenstein, Supply Officer of the 83rd Chemical Battalion; Captain Franklin P. Shoenberger, Security Officer, Chemical Corps School; and Captain Andrew J. Koza, Commanding Officer of Demonstration Company, School Support Battalion.

ARMY HONORS FREDERICK CHAMBER OF COMMERCE

Secretary of the Army Wilber M. Brucker, during a recent visit to Fort Detrick, Frederick, Md., presented the Department of the Army Certificate of Achievement to the City of Frederick's Chamber of Commerce for its achievement in developing a mutual community relations program with Fort Detrick, the Biological Warfare Laboratories of the Army Chemical Corps. Secretary Brucker expressed the gratitude of the Army to the Chamber for its spontaneous sponsorship of the "Fort Detrick Appreciation Week" last October. Joining hands with the Chamber for that program were State, County and City officials as well as private citizens. The week was climaxed by a dinner at which Col. John J. Hayes, commanding officer of Detrick, together with the military and civilian personnel of the installation was honored. Pictured above are (left to right): Colonel Hayes; Secretary Brucker; Mr. Donald B. Rice, President of the Chamber; Governor Theodore R. McKeldin of Maryland, and Major John A. Derr of Frederick. A large delegation from Frederick and Maj. Gen. William M. Creasy, Chief Chemical Officer, and members of his staff were guests of Mr. Brucker at a luncheon following the ceremony.

MISS AMOSS HEADS NEW LIBRARY ORGANIZATION

Miss Alice M. Amoss has been appointed Librarian of the CWL Technical Library, U. S. Army Chemical Warfare Laboratories, Army Chemical Center, Maryland. This appointment resulted from the reorganization of the Chemical Corps last year. Subsequently, the libraries of the Chemical and Radiological Laboratories and the Medical Laboratories were consolidated to form the CWL Technical Library. Miss Amoss has served as a technical librarian in the Army Chemical Corps for 38 years. Mrs. Helen H. Marquand, whose special field is medical and biological sciences literature, was appointed Assistant Librarian for Readers' Services and Reference, and Miss Margaret B. Thornton, whose special field has been the acquisition and processing of foreign reports, was appointed Assistant Librarian for Technical Processing.

MR. CHARLES E. DANNER RETIRES

ARMY CHEMICAL CENTER, MD.—Mr. Charles E. Danner, former chief of the Analytical Research Branch, Chemical Research Division, Chemical Warfare Laboratories, at this post, recently retired after 36 years of service.

An analytical chemist with the DuPont Company before coming to the Chemical Center in 1921, he is a native of Beaufort, South Carolina, and an alumnus of the University of South Carolina.

For his work covering the World War II years, Mr. Danner was awarded an Emblem for Meritorious Civilian Service. Mr. Danner's home is in Baltimore.

100TH CHEMICAL GROUP WINS SAFETY ARWARD AT McCLELLAN

FORT McCLELLAN, Ala. — The 100th Chemical Group recently received the "Certificate of Merit for Safety" at the Fort. This award was presented to the Group Commander, Col. M. A. Peerenboom, by Col. John M. Palmer, Commanding officer, U.S. Army Chemical Corps Training Command at a Ceremonial Retreat Parade conducted at the Fort in which units of the 100th Chemical Group participated.

The award resulted from a marked reduction of automobile accidents involving the Group during the perioa 1 July through 31 December, 1956.

Statistics prove that automobile accidents account for the greatest number of lost time injuries in the Armed Forces.

ROCKY MOUNTAIN INDUSTRIAL PROPERTY DIV. WINS AWARD

The Rocky Mountain Arsenal award of Merit was recently presented to the Industrial Property Division and the Storage and Service Branch of the Arsenal for more than 200,000 man hours of work without a disabling injury. In the picture (left) shown viewing the awards are: (l to r) Bruce Baird, Arsenal Safety Director; Major Alton K. Smith, Chief Industial Property Division; Colonel Donald G. Grothaus, Arsenal Commander; Loell D. Roles, Chief Storage and Service Branch, and Thomas H. McElroy, Deputy Chief, Industrial Property Division.

SERVICE UNIFICATION TRADITIONAL AT THE CHEMICAL CORPS SCHOOL

FOR McCLELLAN, ALA.—Unified by the common goal of defending their country, three officers of different branches of the Armed Forces met on the stage of the Army Chemical Corps School auditorium here recently.

The occasion was the graduation of the Fifth Naval Atomic, Bacteriological and Chemical Defense Course, and the officers (l to r in the picture herewith) were Capt. Tom S. Parsons of the Marine Corps, Col. Carl V. Burke of the Army, and Cmdr. Howard S. Walker of the Navy. Captain Parsons had just completed the five-weeks course.

Colonel Burke, the school's Commandant, in his closing address to the class of 30 Navy men, Marines, and civilian government workers, stressed that, faced with a new type of warfare, America's most effective defensive weapon is knowledge. He spoke of the Naval ABCD course as a cooperative effort, a sharing of knowledge among the services, stating its effectiveness goes much further than the individuals who actually attend the course.

The main purpose of the course, as emphasized by Commander Walker, Commanding Officer of the Naval Unit, is to prepare the students to assist their home station commanders in training missions. In this way, knowledge gathered here is disseminated throughout the services.

The cooperation between the U. S. Army Chemical Corps and the U. S. Navy is one of the oldest and most successful instances of unification in the Armed Forces. Since World War I, the Navy has maintained liaison with the Chemical Corps through Naval Units stationed at various Chemical Corps establishments.

The Naval Unit at Fort McClellan is a typical example. For many years, Naval Officers have both attended and assisted in the instruction at the Chemical Corps School, formerly located at Edgewood, Maryland.

Although closely integrated with the Chemical Corps School, the Unit is a distinct unit of the Navy with its own Commanding Officer, a staff and faculty of seven naval officers and a "crew" of five enlisted bluejackets. Most of the Navy instructors conduct certain instruction for Army classes at the School, and the Naval classes in turn receive considerable assistance from Army instructors.

Approximately 35 officer students are graduated from the ABCD course every five weeks.

THE HISTORICAL CORNER

The Chemical Corps' First Dead

By BROOKS E. KLEBER

Historical Office, Chemical Corps

With the observance of Memorial Day recently behind us, it is fitting to remember that twenty-nine years ago this summer the Chemical Corps lost its first men in action. Four members of Company B, First Gas Regiment, were killed in the Chateau-Thierry sector by enemy bombardment. They were 2d Lt. Joseph T. Hanlon, Pfc. George J. Panuska, Pvt. H. R. Guilefuss, and Pvt. John Merkel.

Given the assignment of getting Stokes mortars and ammunition to front line firing positions near Villers-sur-Fere, Lieutenant Hanlon, during the early hours of 30 August 1918, led his carrrying party forward through a night that was dark and on a road which was unfamiliar. Although enemy artillery fire was heavy, for a while the group was lucky and proceeded unscathed. Finally, several shells landed in its midst. Panuska and Guilefuss were instantly killed; Hanlon and Merkel died shortly thereafter.*

These men were but the first of the many who have since given their lives for their country as members of the combat units of the Chemical Corps. The combat units, which were to take the form of chemical mortar battalions, served with great honor in World War II and Korea.

During the Korean conflict, the mortar battalions were taken from the Chemical Corps. Today the remaining comparable unit is the 2d Weapons Battalion, stationed at Dugway Proving Ground and established on a TD basis. Having been given the history, honors, and lineage of the famed Second Chemical Mortar Battalion (in turn, the lineal descendent of the First Gas Regiment), the 2d Weapons Battalion represents the current generation in a distinguished succession.

At present it is not known whether or not the contemporary battalion will take the field again. If it does, the unit has a brilliant record to emulate; if it does not, the Chemical Corps has a combat heritage, stretching back to Hanlon and the other dead of the First Gas Regiment, of which it can well be proud,

*Hanlon was awarded the Croix de Guerre by the French Government and has several times been memorialized by the Chemical Corps. In France, the CWS Experimental Field of World War I was named in his honor. A street at Army Chemical Center also bears his name.

NOTE: World War I information is taken from James Thayer Addison, *The Story of the First Gas Regiment*, Houghton, Mifflin & Co., Boston, 1919.

NEW CIVIL DEFENSE GAS DETECTOR KIT

The Federal Civil Defense Administration has announced development of a new chemical agent detector kit for detecting dangerous concentrations of war gases such as might be used in an attack on the United States.

The kit is described in a technical bulletin just published by FCDA. It is designed for use by civil defense personnel.

FCDA adapted the kit from an original design by the Army Chemical Corps for the Navy. Weighing only 14 ounces, the rectangular-shaped kit can be carried by the user on his belt. The kit holds a 1½-ounce rubber aspirator bulb, a plastic spring-type detector tube dispenser, small dropper bottles for testing gases, and a supply of reagents for preparing gas solutions.

A.F.C.A. CHAPTER HELPS TO PROVIDE PROJECTOR FOR SCHOOL

ARMY CHEMICAL CENTER, MD.—The Edgewood High School now has a new movie projector thanks to the community efforts of three local organizations.

Some months ago the Army Chemical Center A.F.C.A. learned of a need in the local high school for a projector for the school's science instructions. Lt. Col. Allan C. Hamilton, chapter president, obtained the aid of the local Lions and Sojourners and they raised several hundred dollars, purchased a mobile, single unit projector and presented it to the school. The picture above shows Mr. Floyd Elmer of the school accepting the projector from Colonel Hamilton.

Although the science department first brought to light the need for the machine, Mr. Earl Lightcap, school principal, stated that the school already has plans for its extensive use in other academic departments also.

STATISTICAL ENGINEERING SYMPOSIUM HELD AT ACC

EDGEWOOD, MD.—The annual two-day Statistical Engineering Symposium, sponsored by the Engineering Command of the Army Chemical Corps and designed to promote mutual understanding and appreciation of problems encountered by both the statistician and the engineer, was held at the Army Chemical Center on May 2 and 3. The Commanding Officer of the Engineering Command is Colonel William J. Allen.

This year, statistical engineering development and techniques that contribute to industrial and military preparedness were the subjects under discussion.

Mr. George B. Beitzel, assistant director for production, Office of Defense Mobilization, Washington, D.C., spoke on the government's new industrial mobilization policy. Other speakers were Mr. Marvin Zelen of the National Bureau of Standards; Mr. L. Kent Reitz of Eastman Kodak Corporation; Mr. Leonard Janofsky, General Electric Corporation; Dr. Harry Rosenblatt, Office of Naval Research; Mrs. Mary D. Lum, Wright Air Development Center; Miss Bonnie Small, Western Electric Corporation; Mr. Leo Tick, New York University; and Messrs. Stanley Woodson and Henry Ellner, employed at the Army Chemical Center.

HELPFUL ANSWERS TO CAUSTIC QUESTIONS

As a leading supplier of Caustic Soda, Columbia-Southern is asked many questions each month about this versatile "workhorse" alkali. While the answers probably are not completely new to every Caustic user, they do re-emphasize certain basic points that shouldn't be forgotten. We hope that you will find this series interesting and helpfully informative.

At what concentration is liquid Caustic Soda normally stored?

It is normally stored at a concentration of 50%, although during winter months provision must be made to maintain temperatures above 60°F. It is general practice to dilute shipments of 73% liquid Caustic Soda to 50% concentration for storage. To store at 73%, heated tanks with special linings are required.

How much Caustic Soda is produced along with Chlorine in the Electrolytic process?

For each pound of chlorine, approximately 1.1 pounds of Caustic Soda are produced.

How is solid and flake Caustic formed?

To obtain the anhydrous forms of Caustic Soda, 73% liquor is boiled in large cast iron "fusion pots," driving off the water and leaving Caustic in a molten state. For solid Caustic Soda, the melted Caustic is poured into steel drums and allowed to harden. Flake Caustic Soda is produced by freezing the melted Caustic on a water-cooled rotary drum called a "flaker," after which it is sized by screening and packed in metal drums for shipment.

What is the best way to dissolve solid Caustic Soda?

There are two prescribed methods. (1) Split the drum at the seam with a crowbar and remove the metal from around the solid Caustic cake. Roll the exposed cake into a dissolving tank that is depressed below floor level. (2) Perforate the drum with a pointed tool or axe. Hoist the drum into an elevated dissolving tank. For either method, do not add water until after the Caustic or drums have been placed in the tank.

What are some of the typical savings of customers who have changed from buying 50% to 73% Caustic liquor?

One user invested $2,120 in equipment needed to unload and dilute 73% liquor to 50% and saved $20,979 in five years. Another user saved $2,850 in the first year on an investment of $2,650—or a return of 108%. A third one—a very large user—had a 1003% return the first year on an investment of $3,500—or a total of $35,000.

How much is tank car handling reduced by purchasing 73% vs. 50% liquor?

Forty percent fewer cars need to be handled for the same tonnage. For example, a customer using 2,000 tons of Caustic, solid basis, would require the following shipments:

73% liquid	*Tons per car*	*No. cars*
8,000 gallon cars	42	47
10,000 gallon cars	53	38
50% liquid		
	Tons per car	*No. cars*
8,000 gallon cars	26	77
10,000 gallon cars	32	62

If you would like amplification of any of the answers on this page, or of any other answers previously presented, you are invited to write our Technical Service Department at no obligation to you whatsoever.

Did you know that you handle 40% fewer cars when you buy 73% Caustic liquor rather than 50%, to obtain the same Caustic content?

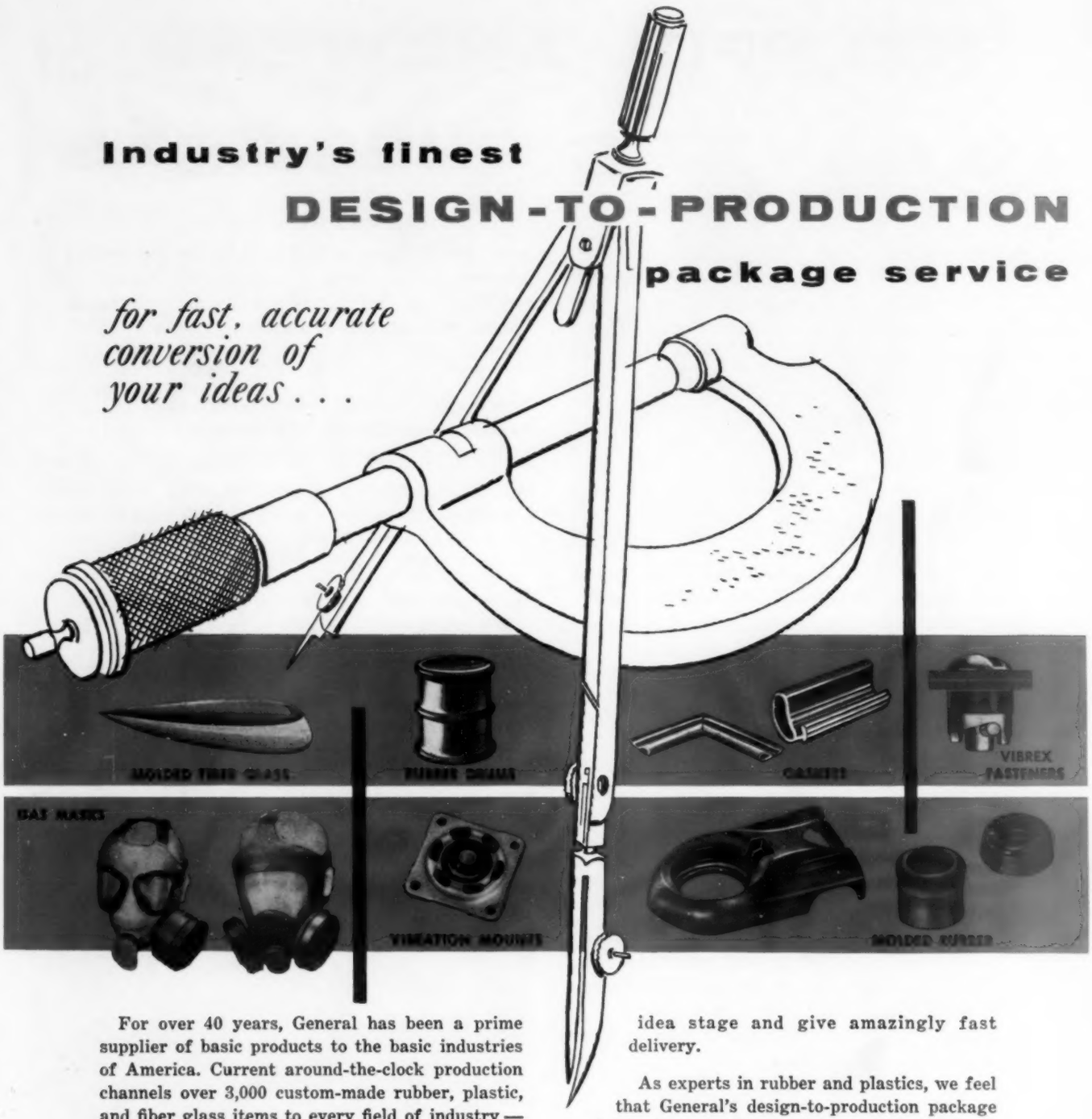
COLUMBIA-SOUTHERN CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

DISTRICT OFFICES: Cincinnati • Charlotte • Chicago • Cleveland • Boston
New York • St. Louis • Minneapolis • New Orleans • Dallas • Houston
Pittsburgh • Philadelphia • San Francisco

IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

Industry's finest DESIGN-TO-PRODUCTION package service

for fast, accurate conversion of your ideas . . .



For over 40 years, General has been a prime supplier of basic products to the basic industries of America. Current around-the-clock production channels over 3,000 custom-made rubber, plastic, and fiber glass items to every field of industry — automotive, aircraft, petroleum, household and electrical appliances, communications, textile, heavy machinery, and the military.

The backbone of this vast operation is an unusually large staff of engineers, designers, researchers, and development men. Working with the finest mechanical facilities in the business, these specialists can take your product in the idea stage and give amazingly fast delivery.

As experts in rubber and plastics, we feel that General's design-to-production package is the best possible combination of talent and ability-to-produce.

- Extruded Rubber
- Molded Rubber
- Latex Foam
- Urethane Foam
- Extruded Plastic
- Polyester Glass Laminates
- Silentbloc Machinery Mounts
- Silentbloc Bushings, Bearings
- Silentbloc Instrument Mounts
- Vibrex Fasteners
- Glass-Run Channel
- Rubber-to-Metal Bonding
- Rubber-Metal Assemblies
- Oil and Hydraulic Seals
- Hydraulic Brake Parts
- Lathe-Cut Parts
- Die-Cut Parts
- Metal Stampings
- Molds, Dies, Tools, Jigs
- Custom Metal Fabrication

Industrial Products Division GENERAL THE GENERAL TIRE & RUBBER CO.

***For additional information on General's diversified products and services, write to:* The General Tire & Rubber Company, Industrial Products Division, Wabash, Indiana.**

GENERAL TIRE & RUBBER CO.

Industrial Products Division • WABASH, IND.